TempMaster™ series M2

user manual

for TS/KTS console together with
M2 series of hot runners controller

Mold Masters
performance delivered

KEEP THIS SHEET SOMEWHERE SAFE

Every machine leaves our factory with two levels of password protection. We recommend that you change these as soon as possible to establish your own security.

System Password - linux

User Password - unix

User Manual for TS/KTS Console

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This manual is intended for use with the KTS/TS Console and M2-Series Controller

(Serial No.....) with which it was supplied.

This manual is written and prepared for Software Version – 8th October 2012

Our policy is one of continuous improvement and we reserve the right to alter product specifications at any time without giving notice.

Publications

Issue	Date	Changes	Author	Authorised
1.01	Nov 2010	First formal Issue	DH	SK
1.02	Jan 2011	Additional Console switch and power connector instructions	DH	DH
1.1	Feb 2011	QuadIO Reset Time function added “Setting Up” section revised	DH	IE
1.2	Feb 2011	Display Page - other Symbols added	DH	SK
1.21	Mar 2011	Correction to password details	DH	JS
1.22	Mar 2011	New power/temperature trace option on Graph Page	DH	SK
1.30	June 2011	Display Page Resize and New Tool default types added.	DH	IE
1.31	August 2011	New Print options allow “Print to File”(USB Stick)	DH	IE
1.32	Dec 2011	Power connector changed to C13 connector	DH	DH
1.4	Jan 2012	Updated information about supplementary circuit fuses	DH	DH
1.5	May 2012	Instructions for using the IO5 tool-load card added along with changes to ToolStore page	DH	DT & IE
2.0	Aug 2012	New Sequence Valve Gate Card added. Create First tool and New Tool revised Ground Fault Limit option introduced Amps option added to Easyview IO Card has new mini-panel on Display page	DH	DT & IE
2.1	Aug 2012	Extra information about Ultra Speed Extra information about Tool Test and deviation	DH	IE
2.2	Oct 2012	New Purge Feature	DH	IE

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Introduction

Specification

The following are general specifications. The actual controller/console supplied may have contractual variations and differ in some specified options.

Supply Voltage	415 Volts 3 -phase 50/60 Hz with neutral. Other available include 240/380/400 and 480 volts in Star or Delta configuration.
Voltage Bandwidth	Stable within (20% supply voltage swing
Supply earth-leakage trip	300mA (note: this is for tool protection)
Overload protection	Miniature Circuit Breaker
Mains Voltage output pattern	Burst-fired with zero voltage crossover
Low Voltage output pattern	Typically 24 volts AC. User configurable between burst-fired or phase-angle.
Output overload protection	High-speed semiconductor fuse links
Temperature control method	Closed-loop (Auto) or open-loop (Manual) with HR Software
Control range	0 – 472° Centigrade (Celsius), 32-881° Fahrenheit
Temperature Scale	Centigrade (Celsius) or Fahrenheit
Printer Output Connector	USB Port
Data Communications	RS-232 serial, DB9 male connector
Alarm Output	Closing Contact Relay 5 Amp max
T/C Tool Connector	Harting type Han A or equivalent
Heater Tool Connector	Harting type Han E or equivalent

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Safety Instructions

DO NOT open the controller cabinet without first ISOLATING the electrical supplies - there are unguarded terminals inside the cabinet which may have a dangerous potential across them.

Where a three-phase supply is used then this potential may be at 415 volts or higher.

Safety Notices - an explanation

A WARNING symbol and message, shown here, identifies where there may be a hazardous situation which, if not avoided, may result in death or injury to personnel.

Most warnings pertain to electrical aspects and you must comply with them to minimise any personal danger.

A CAUTION warning identifies where there may be a hazardous situation which, if not avoided, may result in damage to property.

Caution warnings present no personal danger, but may cause the equipment to fail or lose its memory.

Where to use this equipment

The display console and controller cabinet together are designed for use in the plastic injection moulding industry as temperature controllers for third party hot runner systems as commonly used in mould tools. They must not be used in residential, commercial or light-industrial environments. Furthermore, they must not be used in an explosive atmosphere, or where there is a possibility of such an atmosphere developing.

The HRC cabinet and Touch Screen console should be installed in a clean dry environment where the ambient conditions do not exceed the following limits: -

- Temperature 0 to +35°C.
- Relative Humidity 90% (non-condensing)

Check your wiring

Before you energise the system, pay special attention to how the supply to your controller is wired and how it is connected to the mould.

Lack of attention to detail causes errors such as:

- incorrect wiring of mains supply phases into the controller
- crossing heater supply feeds with thermocouple detection (although this error can be eliminated by the adoption of Mold-Masters Standard connections)

In such cases wiring errors have caused equipment failure.

Mold-Masters® cannot be responsible for damage caused to the controller by customer wiring and/or connection errors.

Isolate the Controller

The main power switch is sufficiently rated to disconnect the total load current during switch On and switch Off. To prevent its operation, during maintenance, you can use a suitably-sized padlock, or similar device, to lock the switch in the Off position.

Larger Controllers may have multiple supplies with multiple isolators. For such controllers then all Isolators must be turned off for safe access into the cabinet.

Switching On

Main Cabinet

Switch ON the Main Isolator to energise the main cabinet.

KTS Console

The KTS Console has a main On/Off switch, at the rear right-hand side of the console case, which is normally left switched “on”.

If left on then the console will start its boot up sequence as the cabinet is powered up.

If the cabinet is switched on and the console does not start then check this switch has not been turned off.

TSA2 Console

The TSA2 Console has a non-latching push button at the bottom right hand side of the screen. After switching on the main cabinet on you then need to briefly press the start button until it illuminates. Release the button and the console will start its normal boot-up sequence.

Mold Heating

After the consoles have started and the main display screen is visible then the controller may, or may not, start to heat up the zones; it depends on how the Console-Startup option is configured. (see page 37).

If Console startup is set to “Stop” then the tool remains at zero power and at room temperature. If it set to any of the other three options (Startup, Standby, or Run) the controller applies power to the zones so that they heat up.

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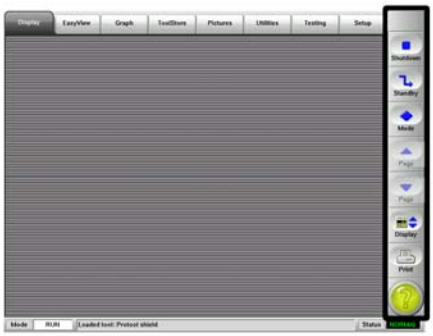
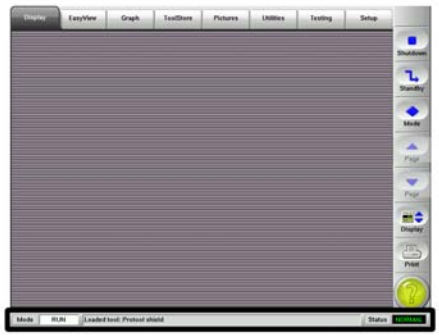
Switching Off (or Shutting Down)

We recommend that you use the console to shut down the heating load, and only use the main isolator to switch off a dormant controller.

1. Shut down the heating. On the main page, select the [**Stop**] mode and reduce the heating to zero.	
2. Shut down the Console On the Utils page, touch the [**Exit**] button and this will shut down the Console Computer.	
3. Shut down the Controller Finally, use the main power switch to isolate all the power to the whole system.	

Screen Layout and Navigation (Common to all pages)

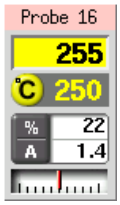
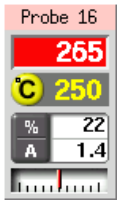
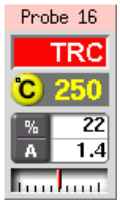
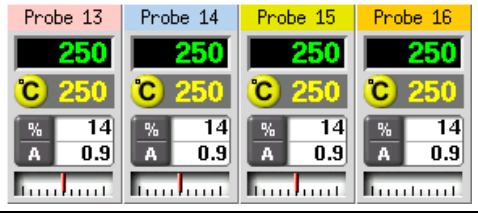
Navigation Top tabs to move from page to page	
Control Side command buttons that change from page to page	
Monitor & Information Bottom row shows : Current Run Mode, Current health status, miscellaneous information	

The Display page

Can be used for

- **Monitor** – observe zone condition
- **Control** – Start/Stop & Boost/Standby immediately available. All other ("Standby, Shutdown, Stop") available from [**Mode**] button
- **Set** – select any one or more zones to get [**Set**] function to set or alter zone setpoint or run modes.

Monitor

This Healthy Zone shows: **Zone Name** (user configurable) **Actual Temperature** (may be Coarse at whole degree steps or Fine at tenth of a degree steps) **Scale** and **Set Temperature** **Applied Power (%)** **Applied Current (**Amps) **Deviation** - between Actual & Set Temperature		Green text on Black background
Warning Zone Deviation exceeds 1st stage (Warning)		Black Text on Yellow Background
Alarm Zone Deviation exceeds 2nd stage (Alarm)		White text on Red Background
Fatal Zone Problem detected (see page 107 for details)		White text on Red Background
Zone Off Individual zone switched off		
Different header colours User-configurable colours		

Display Page – other Symbols and what they mean

The previous page shows the more common parameters that you expect to see on a temperature controller – however there are more. Some of which may be immediately obvious and others which may be less so.

Parameters that are Set

Temperature

Degree C		Degree F	

Flow (monitoring coolant flow with analogue or digital devices)

Gallons (per minute)		Litres (per minute)	

Pressure (monitoring coolant pressure with analogue devices)

Bar		PSI	

Other

Percentage (a set percentage power output for a zone with no thermocouple or closed loop)	

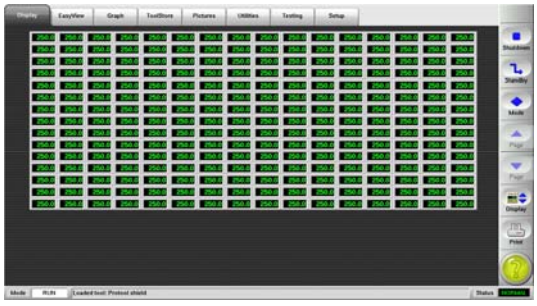
Parameters that are Measured (and displayed)

(seen in lower half of panel)

Percentage (power output for that zone)		Ampere (Current measured in a zone)	
Delta (a “difference” symbol used when comparing flow or pressure between two points		Ohms (Resistance value of a zone calculated from stated voltage and measured current)	
Reynolds Number (an indication of the quality of coolant flow in a circuit)		Blank (no quantity currently on display	

Display Page – Monitoring (TSA2 wide screen)

The TSA2 has a wide screen format which offers more zones on the display page. Other pages appear similar to the standard format KTS which are used throughout the rest of the manual.

Use [**Page Up**] or [**Page Down**] to scroll up and down to see more zones Or Use [**Display**] button to show… 80 zones – each zone shows Title, Actual, Set, Power, Current and deviations	
144 Zones - each zone shows Title, Actual and Set	
224 Zones - each zone shows Title and Actual	
240 Zones - each zone shows Actual Temperature	
Data page which shows the setup and data for all the console zones.	

Display Page – Monitoring (KTS standard width)

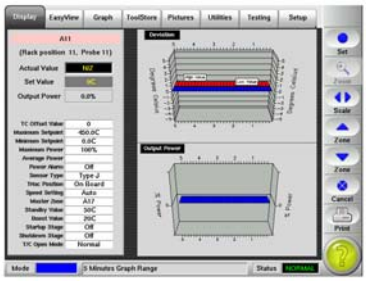
Use [**Page Up**] or [**Page Down**] to scroll up and down to see more zones Or Use [**Display**] button to show… 40 zones – each zone shows Title, Actual, Set, Power, Current and deviations	
70 Zones - each zone shows Title, Actual and Set	
110 Zones - each zone shows Title and Actual	
160 Zones - each zone shows Actual Temperature	
Data page which shows the setup and data for all the console zones.	

Display Page –Resizing for fewer zones

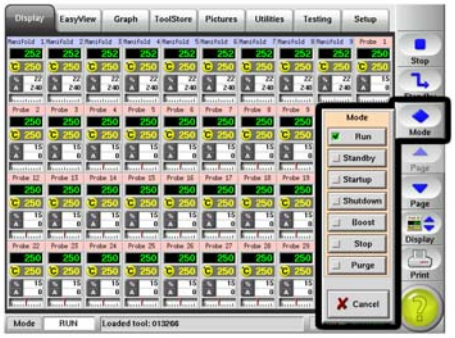
Both the TSA-Wide and the KTS can resize individual zone panels if there are not enough zones within the tool to fill the first page.

Big Panels 30 zones or less in TSA-wide 12 zones or less in KTS	
Medium Panels 48 zones or less in TSA-Wide 24 zones or less in KTS	
Normal Panels ***80 zones or less in TSA-Wide*** ***40 zones or less in KTS***	

Display Page – Monitor (Zoom)

Touch any zone and [**Zoom**]	
Zoom page shows: * Zone Settings * Recent Temperature Deviation * Zone Power Levels (Historical)	

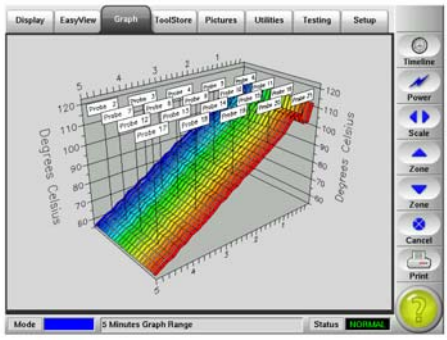
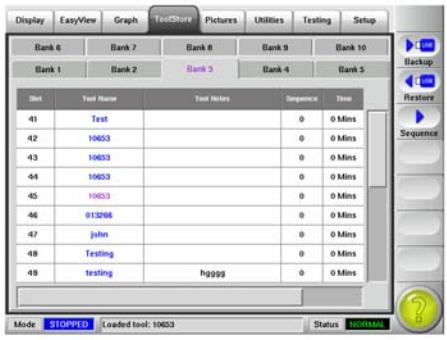
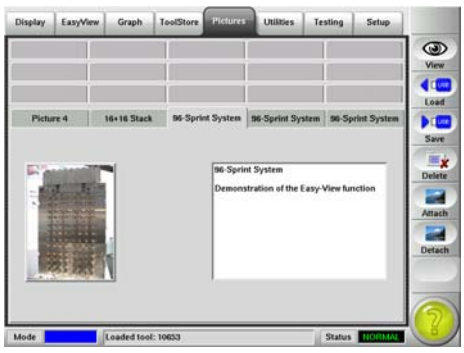
Display Page – Start, Stop and more

Button 1 Can appear as [**Run / Stop**] or [**Startup / Shutdown**]	
Button 2 Can appear as [**Boost**] or [**Standby**]	
Button 3 – Mode Reveals all run mode options	

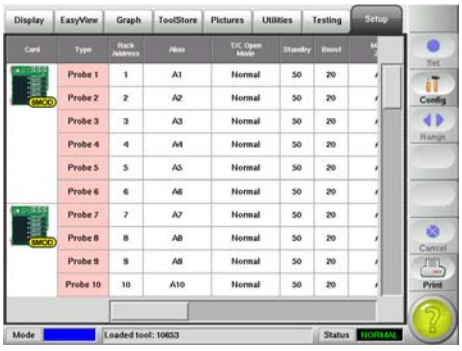
Display Page – Setting Temperature

Touch one zone	
Touch another	
Touch [**Range**]	
Touch [**Set**]	
[**Mode**] bar to set zone as Closed (Auto Temperature) Open (Manual Power), or Slave (to another zone) [**Value**] bar to Set, Raise or Lower temperatures	

More Pages

EasyView Shows zone temperature and their position in the tool. Shows Zone Status Can be used to Set zone temperatures	
Graph Page Shows graphs, of temperature versus time, for up to twenty zones at a time.	
The ToolStore page This is a tool bank in which you can store up to 200 tool configurations.	
The Picture page Save, and display, up to 20 drawings or pictures.	

More Pages

The Utilities page Contains several sub pages: **System**- change the passwords and the system clock. **Printer** - select a driver for your printer **Event Log** - to find changes that have been made to the controller settings **Network** - set up the Controller to communicate over a network **Export** - obtain historical performance data for any zones over the last 24 hours. **Remote** - view any other networked computer via a Virtual Networked Computer (VNC) protocol and set up a remote Master IP address. **Quad IO** - set up Quad IO card Inputs and relay outputs.	
The Testing page Check the condition of a mould tool after commissioning or maintenance.	
The Set-up page For setting up the system.	

The User Interface

Where the configuration of parameters requires a user interface then either a keyboard or a keypad is displayed.

Keyboard for Alpha-numeric input	
Keypad 1 Basic numeric	
Keypad 2 Basic keypad PLUS Value – Set, Temp, Add and Subtract and Mode – Auto, Manual and Slave	
Keypads – 3 & 4 More buttons to select and configure synchro-tips	

Setting up your controller

New Touch Screen consoles and controllers are provisionally configured at the factory and you may not need this section for a new system.

However, if you need to match a Touch Screen console to a new tool or environment then you should use this section of the manual and work through the four main stages which are briefly described below.

Subsequent pages within “Setting Up” section give a more detailed explanation of each.

1 - Create a first tool

This starts at the Tool Page where a [**Detect**] command interrogates the cabinet to see what various cards are available and then puts that information into the Setup page. .

2 – Set up Tool parameters

Once the card information has been written into the Setup page you then need to look at the displayed cards and allocate a duty to those cards.

It may be that your cabinet is fitted throughout with four-zone 15 Amp cards, but it takes local knowledge to know which zones are nozzles, which are manifolds or bridges and which are sprue bushes. A screen that simply reads Zones 1-60 is not as instructive as one that reads Nozzles 1-40, Manifolds 1-8 etc. Setting your zones to reflect the tool not only makes it easier to use but it will also pre-program control-card characteristics so they are more likely to match the heat load. Even though automatic first time start can do this for you it helps if the cards have some idea of their duty before they are first used.

Once card duty has been allocated then the various tool parameters will take up default values – these may be fine for your general use, but there are many tool parameters (such as warning and alarm levels) which you may wish to fine tune to your particular tool. You should also note that they are all configured on a zone-by-zone basis which can allow you to make precise settings.

Note also, all the values on the setup page are stored with the tool setting which is currently selected on the tool page. If you go to the tool page and load a new tool for a different purpose then the new tool may well bring its different setting into this page.

3 - Configure Tool and System Settings

The [**Config**] button opens more settings which are grouped into…

- “Tool Settings” (such as Alarm Time and Startup Mode) which will be specific to this one tool.
- “System Settings” (such as such as Language or Screen Blanking times) which will be commonly set for whichever tool is loaded into your console.

4 – Set up Operating Parameters

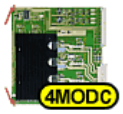
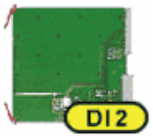
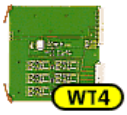
Once you have all the above set to your particular system you finally need to go back to the main Display Page and set your main operating temperatures and other values required for any monitoring zones that you may have in your console for steel temperature, water flow, coolant temperature or other ancillary facilities.

Create a first tool

1. Select the ToolStore page.
2. Select a blank sub-tab and touch [**Detect**].
3. Enter System password.
4. Type in a new name for the tool and press [**Enter**].
5. If the tool is connected via a Network to any other cabinet, the next step presents an option to select the local controller (labelled “Serial Port”) or a remote controller (labelled hrcnetx).
   If no network-connected controllers are detected, then it automatically passes this option and goes straight on to step 6.
6. The console runs an automatic “Card Detect” routine to find out what type and how many cards are fitted in the selected controller. Once it has gathered this information then the console opens the Setup page for you to start configuring the new tool.
   If the system has any problem running the detect sequence it may report an “Auto Detect Failed” and ask if you want to repeat the Detect routine. If the reason for failure is obvious, such as a loose network cable, or a mains glitch, during the Detect routine, then you may touch [**OK**] to re-try card detection.
   If the detection routine continues to fail then contact your supplier for advice.

SetUp Page - cards that may be detected

Cards, initially detected by the New-Tool process, are shown in the second column and will assume their default values. The following is a list and description of the cards that may be detected by your console...

Card	Symbol	Card and Description
Z6		6-zone card at 5 Amp rating for Probes with optional Current sensing
Z4		4-zone card at 15 Amp rating with current sensing and optional Ground Fault monitoring
Z2		2-zone card at 20 Amp rating for manifolds with optional Current sensing
AI8		8-channel 4-20mA Analogue Input card typically used with analogue flow sensors to monitor coolant flow rates.
DI2		16-channel digital input card typically used accept external signals.
WT3		12-channel RTD card used for temperature monitoring using Resistive Temperature Devices.
WT4		12-channel TC card used for temperature monitoring using thermocouple sensors.
IO3/4		4-channel digital Input/Output card for remote signalling.
IO5		4-channel digital Input/Output card for remote signalling. PLUS remote Tool Selection input
DO32		32-channel Digital output Card used to signal external equipment.
SVG		12-channel sequential valve gate card that can open and close valve gates at discreet preset point.

Pre-configured Set-Up values

The table below shows the whole SetUp chart and the differing values that are given to both Probe and manifold zones.

Parameter	Probe and Manifold Cards	Other Monitoring Cards	Synchro/ Spear
Rack Address	slot address*	slot address*	slot address*
Alias	*blank*	*blank*	*blank*
TC Open Mode	Normal	*blank*	Normal
Standby & Boost Temp	0ºC or 0ºF	*blank*	0ºC or 0ºF
Boost Time	0	*blank*	0
Master Zone	*blank*	*blank*	*blank*
Warn Hi & Lo	5ºC or 9ºF	*blank*	5ºC or 9ºF
Alarm Hi & Lo	25ºC or 45ºF	25ºC or 45ºF	25ºC or 45ºF
Alarm Power	Off	Off	Off
Alarms Active	C,B,I	C,B,I	C,B,I
Alarm Time	10 Secs	10 Secs	10 Secs
Max Setpoint Setting	450ºC or 842ºF	450ºC or 842ºF	450ºC or 842ºF
Min Setpoint Setting	0ºC or 32ºF	*blank*	0ºC or 32ºF
Max Power Setting	100%	*blank*	100%
T/C Offset Value	0ºC or 0ºF	*blank*	0ºC or 0ºF
Speed	Auto	*blank*	Auto
Sensor	J-Type	*blank*	J-Type
Display Group	1	*blank*	1
Startup Stage	*off*	*off*	*off*
Shutdown Stage	*off*	*off*	*off*
Reading Avg	0	0	0
Pre-heat	*These Columns do not appear on the set-up page unless a control card is configured to be a Synchro/Tip type*		20%
Boost			40%
Delay			5.0 Secs
Time			5.0 Secs

If these preset figures are not suitable for the tool in question then you can simply change them to your preferred values by following the next pages.

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How to Configure the Control Cards

The Setup Grid displays Icons in the first column to show what cards have been detected.

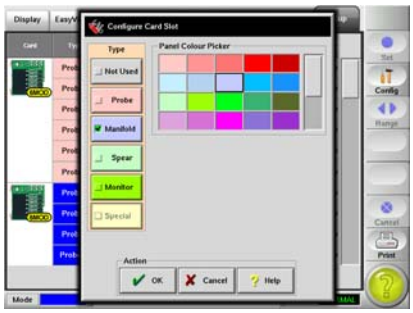
Because none of the cards know their function, all temperature control cards initially default to “Probe” zones along with the Probe default values. (as seen in the first picture)

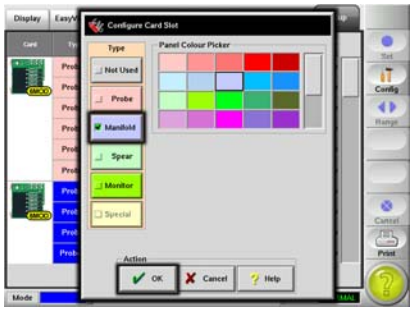
(Auxiliary cards such as Analogue Input , RTD Cards and other similar will also default to values suggested in the table on the previous page “Pre-configures Set-up Values”)

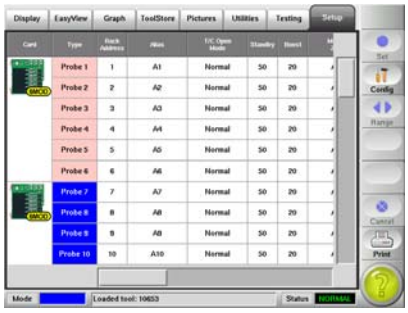
Although the tool may run on this basic setting it is best that you configure any larger, slower zones such as manifolds etc. Surplus zones should also be set to “Not Used” this time (for instance, if you have six cards offering 36 control zones, but only 32 actual zones, it is best to set the last 4 zones to [Not Used] so they do not display false alarms such as T/C Fail).

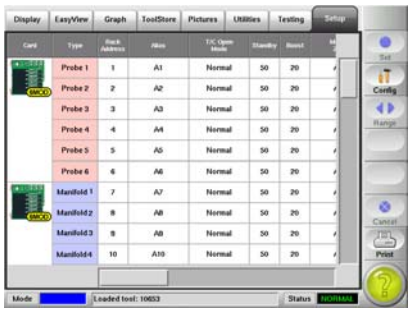
Such configuration is detailed in the following steps.

1. Touch first zone to be re-configured
2. Touch last zone to be re-configured
3. Touch [**Range**] to include all those in between.
4. Touch [**Set**] to see the “Configure Card Slot” menu
5. Select Zone Type which could be
   a) [**Not Used**] is used to switch off unwanted card zones.
   b) [**Manifold**] - which sets the zone to a slower response curve which suits that sized heater
   c) [**Spear**] - is only available when the 4SMODC card is fitted. This card has two twin-channels that are designed to work as a twin Spear-Zone card with one triac used for the body and the second used for the tip.
   d) [**Monitor**] – allows you to use any control zone from a 6MOD, or similar card, as a monitor zone only with no control function.
   e) [**Special**] - There are a number of different cards that are not used for temperature control, for instance
   RTD Zone - suits 12RTD (twelve channel) temperature measuring cards for cooling water
   IO Zone - suits QCIO (four in/out channels) Input/Output cards.
   Water - suits AI8 (8 channel analogue) or 16DLI (16 channel) water flow measurement cards
6. Choose any Header colour if the default selection is not required.
7. Touch [**OK**]
8. Repeat steps 1 to 7 for other types of zones.



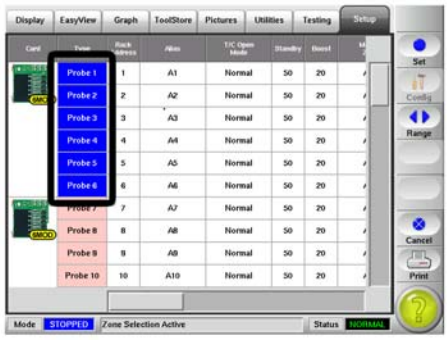
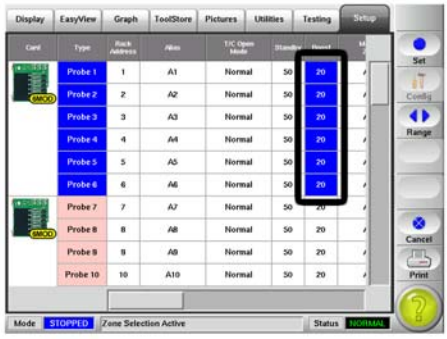






The Setup page is now complete with Cards and Zone types and, as part of this setting up, populated with standard default values. These Tool Parameters may be accepted or changed. Setting, or changing, the parameters are described in the following pages.

Setting the Tool parameters

1) Select the zones	
2) Select the parameter	
3) Touch [**Set**]	
4) Set the Value	

The Tool Parameters

Function	Description	Setting Limits
Rack Position	Identifies the position of the card within the rack	This is not user configurable
Alias	Input for alternative zone names	Has an auto-increment number facility
TC Open Mode	Choose a response for any zone that detects a failed thermocouple. **Normal** – No action corrective taken- the zone power sets down to 0% and it shows a T/C fatal alarm. **Auto Manual** - The zone has sufficient data, after 10 minutes steady running, to switch to Manual mode at a power level that should hold the previous temperature. **Auto Slave** – The zone has sufficient data, after 10 minutes steady running, to slave the failed zone to another similar zone. **Nominated Zone Slaving** – allows you to specify a zone to act as a master to this zone if it were to fail at any time.	
Standby (temperature)	Sets the Standby Temperature for any zone(s)	The maximum Standby temperature is 250°C or 450°F
Boost (temperature)	Sets the boost value for any zone(s)	The maximum Boost value is 250°C or 450°F above the normal set temperature
Boost Time	Set the duration of the "Boost-Temperature"	The maximum period for Boost Time is 9999 seconds.
Master Zone	Select a Master Zone for any groups of sub-zones	Do not select until all zones have been appropriately configured to Probes and Manifolds etc.
Warning and Alarm Levels (Probe or Manifold)	Set the first (Warning) and second (Alarm) stage alarms.	The maximum Warning or Alarm value is 99°C or 178°F.
Warning and Alarm Levels (Monitor Zone)	Set the first (Warning) and second (Alarm) stage alarms –any temperatures reaching the higher Alarm level will generate an automatic Mould STOP signal (like the Quad IO TC card)	The maximum Warning or Alarm value is 99°C or 178°F.
Alarm Power	Will generate an Alarm if any average power level, which is measured over the preceding 8 minutes, exceeds this setting.	This defaults to 100% or "Off" so maximum power can be sustained without generating any Power Alarm.

Alarms Active	Offers a selection table which allows you to decide how any of the following alarm conditions should affect the system: - High Temperature Alarm, - Low Temperature Alarm - Zone Alarm - Power Alarm - Reynolds Number Alarm.	Option for alarm actions are: **Console** – which displays the alarm condition in that one panel and Status Panel **Beacon** – extends the alarm to activate and attached Alarm Beacon and Sounder **Mould Protect** – puts the console to Stop mode. All zone heaters will, as a result, cool down. **Injection Disable** – sends out a shut down signal from the IO card which may be externally configured to stop the moulding machine.
Alarm Time (seconds)	Configure a brief delay between an alarm condition being detected, and an external alarm being sent.	The maximum setting for Alarm Time is 999 seconds
Maximum Setpoint Setting	Sets the highest permitted setpoint for the zone(s)	The highest Maximum Setpoint temperature that you can set is 450°C or 850°F.
Minimum Setpoint Setting	Sets the lowest permitted setpoint for the zone(s)	The lowest Minimum Setpoint temperature that you can set is 0°C or 0°F.
Maximum Power Setting	Sets the highest permitted power level for the zone(s). This will work in either open-loop (Auto) or closed-loop (Manual) configuration. However, it is not effective for 4MODS cards working Seki-Spear probes.	The highest Maximum Power Setting that you can set is 100% power.
T/C Offset Value	Sets a proportional offset between measured and displayed temperature to compensate for a probe where the T/C may not be sufficiently close to the tip.	The highest T/C Offset temperature is ±75°C or ±135°F.
Speed	Select, or over-ride, the Auto-Speed setting to determine the control characteristic for the zone temperature.	Note: The Ultra settings force the controller to stay in burst fired all the time. These settings are used when a very small controller could show temperature instability in Burst fired mode.
Sensor	Select temperature sensor for the zone(s) (J or K type) for xMOD cards or Analogue sensors for AI cards. Analogue sensors read 0-20 mA and may be used for flow, pressure or other device.	
Display Group	Select groups of zones to display on separate Display Pages. By default all zones are in group 1 but selected zones can be allocated to subsequent groups. Zones that need not be shown on the Display page can be allocated to Display Group Zero.	There is a limit of 6 Display Groups.

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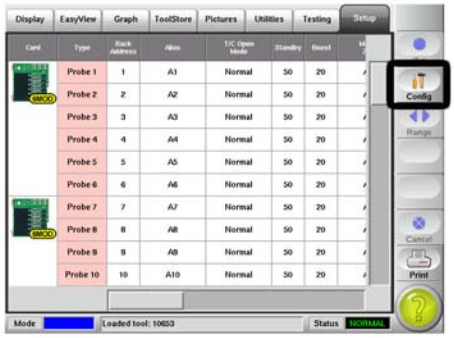
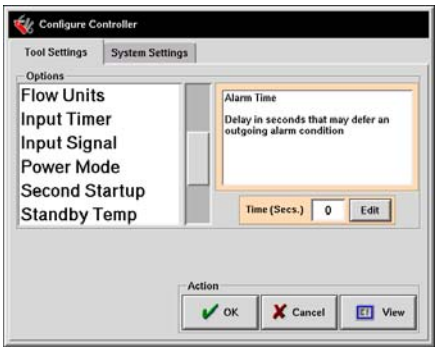
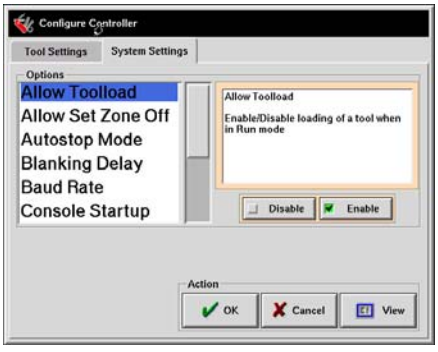
Startup Stage	Configure groups of zones into discrete Startup Groups.	There is a limit of 6 Startup Groups.
Shutdown Stage	Configure groups of zones into discrete Shutdown Groups.	There is a limit of 6 Shutdown Groups.
Readings Avg (for Analogue Input Cards)	Can be used to smooth out analog input display where the sensor may send fluctuating readings. The drop-down list is the number of readings that are read to generate an overall average.	Available setting options are 0, 2, 4, 8, 16 or 32. **NOTE -** *This parameter only appears if an Flow Monitor (Analogue Input) card is detected in the rack*

(The following 4 parameters appear only if a spear card is detected)		
Pre-Heat	Sets the power level for the spear body	
Boost	Sets the power level required to open the tip	
Delay	Sets a delay following the signal to inject until the Boost “opening” power is applied.	
Time	Sets the “Gate-open “period for applying tip power.	

Configuring the Tool & System Settings

Touch [**Config**] to view the Global/Console parameters.	
The Configure Controller panel shows two tabs for Tools Settings and System Settings with a brief description for each. The Tool Settings are concerned with only those parameters which affect the selected tool. To keep the settings or changes made here you must then go to the Tool page and touch [**Save**].so that they are saved within the ToolStore memory with the selected tool.	
System Settings are Global parameters (such as Language) and these are applied to the whole system regardless of what tool has been selected.	
You can see an overview for each of the settings if you touch [**View**] in either tab.	

The Tool Settings

The Tool Settings are those parameters which affect only the selected tool. It takes two steps to save the settings or changes made here. First you must touch [**Accept**] on this screen and then go to the ToolStore page and touch [**Save**]. All changes are then saved within the ToolStore memory for that selected tool.

Function	Description	Limits
Button One Mode	Select [**Run**] or [**Startup**] as the first mode button on the Display page. The "Run" option toggles between Run and Stop. The "Startup" option toggles between Startup and Shutdown.	
Button Two Mode	Select [**Standby**] or [**Boost**] as the second mode button on the Display page	If the controller has spear zones then the Standby option is greyed out and the second button option is fixed as [**Boost**].
Display Mode	Set the display page and set-up page to group the zones as: [**Sorted**] with all Spear zones displayed first followed by Probes, then Manifolds, then Specials. [**Mixed**] which groups the probe and manifold zones as they are positioned within the card rack, (Manifolds may appear out of sequence order, but grouped with their corresponding probe zones.)	
Flow Units	Select whether to quantify the Flow Zones in Gallons or Litres.	**NOTE -** This parameter only appears if a Flow Monitor (Analogue Input) card is detected in the rack
Input Timer (minutes)	If either of the above Stop or Standby options is initiated then this timer starts as soon as the input open/close signal is received. Once this timer period has expired it switches the console into the selected Stop or Standby mode. If, however, the remote signal disappears before the Timer expires than it resets the Timer period to "zero" for a restart.	The maximum period for Input Timer is 25 minutes.
Input Signal	Set how the console responds to a remote input (normally open pair): **STANDBY If Closed** - switches the controller into Standby mode when the remote input is closed; and returns to its previous state when the signal is removed. **STANDBY If Opened** - switches the controller into Standby mode when the remote input is opened; and returns to its previous state when the signal is restored. **BOOST if Closed** - this switches the controller into boost mode when the remote line is closed. **STOP if Closed** - switches the controller into Stop mode when the remote line is closed. **STOP if Opened** - switches the controller into Stop mode when the remote line is opened.	NOTE: 1. The remote input is only effective when the system is in RUN mode. 2. This function defaults to BOOST when the controller has Spear zones. 3. Only those zones that have Boost or Standby temperatures configured in their SetUp will respond to the remote input signal.

Power Mode	Selects how power levels are shown on the Display Page Percentage power is constantly displayed while you have an option on what is seen in the lower window If you have control cards with current measuring coils this option allows the lower window of each zone to show three possible parameters [**Amperes**] shows the zone current [**Watts**] (provided the supply voltage has been set) shows the power in the zone. If there are no current measuring coils then the lower window display will be blank. [**Ohms**] (provided the supply voltage has been set) shows the calculated resistance value for that zone.	
Power Alarm Delay	Allows you to pause the Power Alarm by this many minutes so it does not instantly cause an alarm effect.	Defaults to Zero minutes delay
Pressure Units	Select whether to quantify the Pressure Zones in Bar or PSI.	
Purge Mode	Choose to use a [**Mechanical**] (which uses heat steps only) or [**Chemical**] (to work with special purge compounds)	
Quad IO Reset Time	This is a timer within the IO Card. The timer will set all relay outputs to off (de-energised) if it fails to see communication with the Console within this set time. The default setting is “0” in which case it will not look for incoming signals and operate normally	Maximum Reset time is 90 seconds **NOTE-** This parameter only appears if an IO card is detected in the rack
Second Startup	Select a final operating mode that the console assumes once it has completed a Startup Sequence and attained normal temperature. [**RUN**] is default condition [**BOOST**] will temporarily assume boost settings until it times out. [**STANDBY**] will reduce to Standby Temperature until it is manually or remotely changed	
Standby Temp	Set an overall standby temp which will override individual standby temperature settings that may be configured within the earlier Tool parameters. Leave this set to 0° for individual standby values to remain valid.	Max standby Temp is 260° C

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Startup Mode	Select between three different Startup modes … **MASTER-FOLLOW** - a default option that ties the faster-acting nozzles' set temperature to slower manifold's actual temperature. This produces a homogenous rise with all zone temperatures coming up together. **MASTER-ONLY** –heats only the nominated Master zones first - it does not apply any power to the subordinate nozzles until the Master zones have reached their set temperature. **STAGED** – allows you to nominate up to eight stage groups that will heat up in successive stages. When Staged Startup is selected then the shutdown automatically follows a staged shutdown. Note, however, that there is a separate allocation for shutdown groups – so a shutdown pattern need not be the same as the startup sequence. **AUTO-FOLLOW** – measures the heat gain of every zone and automatically holds back the faster (probe) zones to the same rise rate as the slowest rising zone. This is very similar to Master-Follow but without the need to nominate any one Master.	
Shutdown Timer	Set a delay period to hold on successive groups during a Staged Shutdown. It sets, in minutes, the time that successive zone groups must wait before each switches off. Setting this option to zero makes the timer ineffective so that Staged shutdown is reliable solely on Shutdown temperature.	The maximum period for Shutdown Timer is 99 minutes
Shutdown Temp(erature)	Sets the temperature to which each Shutdown group must fall before the next group is switched off. Raising the shutdown Temperature means that zones do not have to cool down so much until subsequent stages are switched off which shortens the overall shutdown time. Lowering the Shutdown Temperature has the opposite effect and lengthens the shutdown time.	The Shutdown Temperature setting defaults to "0" which represents an extremely long shutdown interval. The highest shutdown temperature permitted is 260° C or 500°F and if this set value is equal to, or higher than, the normal temperature, then it has no effect and the shutdown interval becomes dependant on the Shutdown timer.
Temp(erature) Scale	Select [**Degree C**] or [**Degree F**] as required.	
Weight Unit	Choose to use Metric [**Kg**] or Imperial [**Lbs**] as the unit for weight.	

Finished changing Tool Settings?

If you have made any changes to Tool settings note that it takes two steps to save them. First, you must touch [**Accept**] on this screen and then go to the ToolStore page and touch [**Save**].

The System Settings

These are general settings which apply to the system regardless of what tool may be loaded.

Function	Description	Limits
Allow Global Set	Select [**Enable**] if you wish to allow probe and manifold zones to be set together, or [**Disable**] if they must be set as discreet and separate actions	
Allow ToolLoad	Select [**Enable**] if you want to be able to change tools while in Run mode, or [**Disable**] if you wish to prevent such changes and force the operator to shut down to swap tools.	
Allow Set Zone Off	If set to [**Enable**], then you need no password to switch a zone to off. If you set this to [**Disable**] then you need a System (Level 2) password in order to switch a zone off.	
Allow Standby	If set to [**Enable**] then you can switch the console into Standby Mode from any other operating mode. If set to [**Disable**] you cannot switch from Stop mode into Standby. Instead you must first put the console into a run or start mode before Standby Mode is available.	
Blanking Delay	Set how long the screen remains visible	The maximum period for Blanking Delay is 98 minutes. You can override the Blanking Delay so that it remains permanently visible by setting this time to “99 minutes”.
Baud Rate	Set the communication rate between the Console and the control cards. Newer control cards can work at faster speeds (38400) and units are always matched at the factory. However if you swap a new card for an older one you may need to select a lower baud rate (19200 or 9600) to make it work correctly. If the baud rate is too high for an older card then you will see “N/Z” because it cannot communicate at that speed.	

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Calibrate Touch	If Enabled this starts a routine to check the alignment between where you "actually" touch the screen and where the interface perceives that you touch the screen. The process stops the controller so be careful not to do this while the system is in use. It then places cross hairs at certain points on the screen – respond by touching the screen with a fine pointer rather than a large finger print, and hold it there for 3-4 seconds. When you remove your pointer, it will reposition the target for you to touch again. After a few target points it will finish and recalibrate the screen and re-align its response to where you touched the screen. You then need to restart the console.	
Comms Data	Export the Communication Data for analysis	
Console Startup	Select the operating mode that is assumed after initial switch on.	
Factory settings	This opens a third tab which allows engineer to get maintenance access for system calibration. This is not designed for general use and it is protected by a unique password.	
Ground Fault Limit	If this is set to [**Enable**] the ground fault detection is operative such that the card will reduce output current and so limit the ground fault current. If this is set to [**Disabled**] then fault current can flow to ground. If output is too high then the main output fuse will rupture.	
Language	You may select a preferred language for the screen and online help. It is safe to select a different language while the system is running. Although the Console does shutdown and reopen, it does leave the system running safely during the changeover.	
Limit Exceeded	[**Disabled**] – means that an attempt to set the temperature above the limit is non-effective and the Set temperature stays the same. [**Enabled**] – means that an attempt to raise the Set temperature above the limit will increase the set temperature to the limit and no more.	
N/Z Alarm	[**Disabled**] – leaves N/Z in its normal condition which does not raise a system alarm if it occurs. [**Enable**d] – allows N/Z condition to initiate a System alarm notification in the lower status Window. At the same time it energises the Alarm Relay for remote signalling.	
Power Display	Select Power Display as Peak Amps or Derive (a relation between Peak and % power)	
Slave Address	This is where you can input the Slave address for the console when it needs to communicate via an external protocol.	

Supply Voltage	Enter the System Supply Voltage; It is used to calculate the “Watts” display. This is normally the phase-neutral voltage on a star supply and the phase-phase voltage on a delta supply.	Maximum supplied Voltage is 400V
Temp(erature) Precision	Allows you to set the resolution for the Actual temperature seen on the Display Page to a floating point scale which displays temperature to within one tenth of a degree or an integer scale which rounds the displayed temperature to the nearest whole degree. Select [Float] or [Integer] as appropriate.	
Tool Password	Allows you to set the security level on the Tool page so that the operations of “Delete”, “Save”, “Restore”, and “Backup” may be accessible to level 1 operatives, by selecting [**User**] or only to higher level 2 operatives by selecting [**System**]. However if this is set to [**User**] when “User Password” is set to Disabled, it leaves these operations accessible to any with no password needed at all.	
User Password	If this is set to [**Enabled**] then all password-protected functions need either a User (Level 1) or System (Level 2) authorisation as shown by the Password Application table on page 38. If User Password is set to [**Disabled**] then all the lower functions become available without the need for any password. Only those higher functions that require a System (Level 2) password retain their Password protection.	

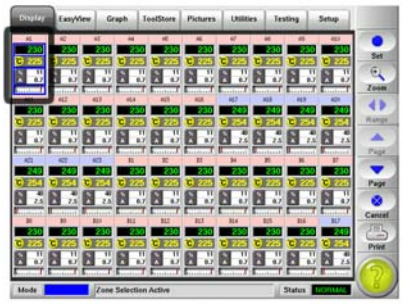
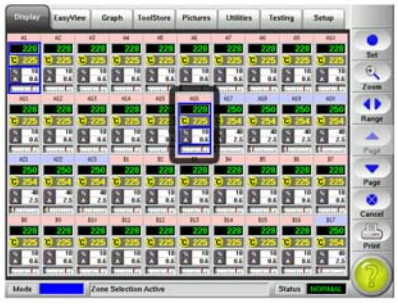
Finished System Settings?

Once you have completed all the necessary System settings, and want to save them, as they have been set, touch the [**OK**] button.

If you do not wish to accept the changes made, touch [**Cancel**]. The configure menu disappears, and the system reverts back to any previous selections that may have been made.

Setting Operating Parameters

Selecting zones

1. Select the First zone	
2. Select the Last Zone	
3. Touch [**Range**]	
4. Touch [**Set**]	
5. Set the Value	

To set Probe and Manifold temperatures

1. Select [**Set**]	
2. Select [**Auto**]	
3. Set the Temperature Value (Touch [**Delete**] to undo any last entered figure)	
4. Touch [**Enter**] to confirm your settings (or [**Esc**] to return to the main page without accepting the new choice and values.)	

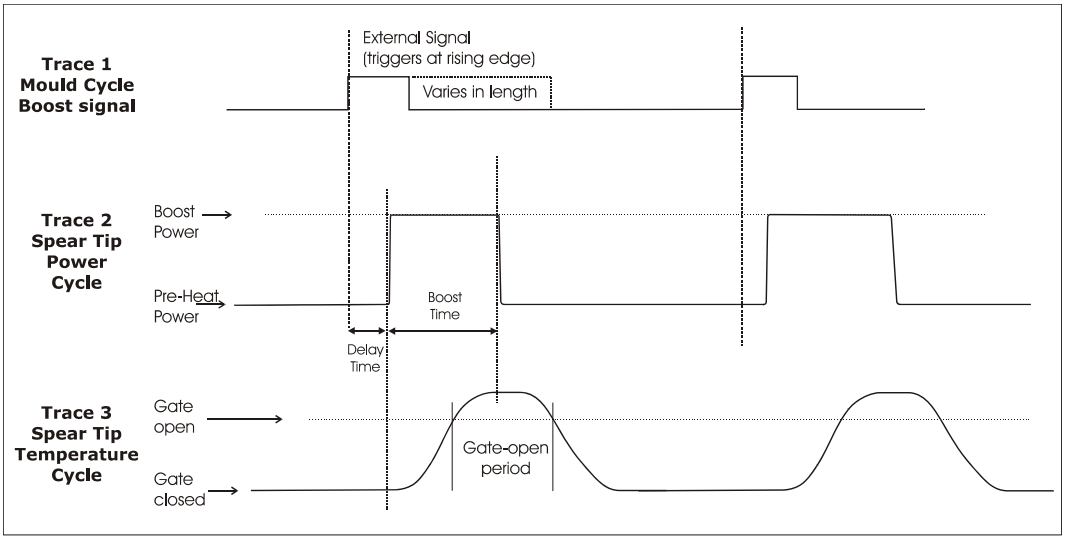
To set Spear (Body and Tip) temperatures

1. Start with body temperature - select [**Auto**]	
2. Set the body temperature	
3. Touch [**Synch**] for Tip Control	
4. This changes the keyboard for the tip settings	
5. Set the first value (Pre-heat)	

6. Touch [**Enter**]	
7. Set the remaining three values (keypad automatically cycles through all four values then clears after the last value is set)	
8. The console view returns to just the Display page.	

About the Spear/Tip Cycle Time

The following shows how a spear tip-temperature cycle relates to the mould cycle.



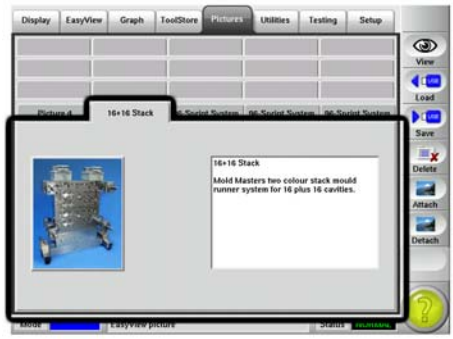
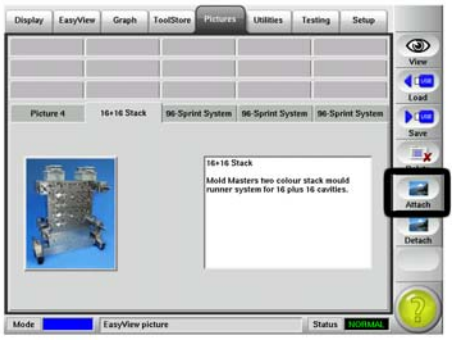
To set Cavities, Water Flows and Chillers

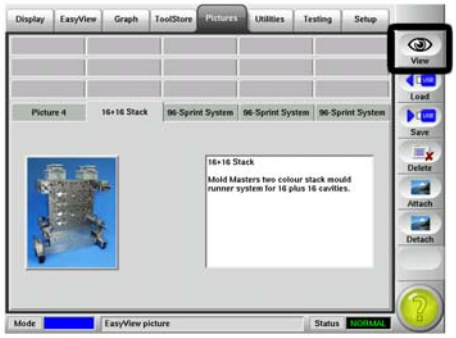
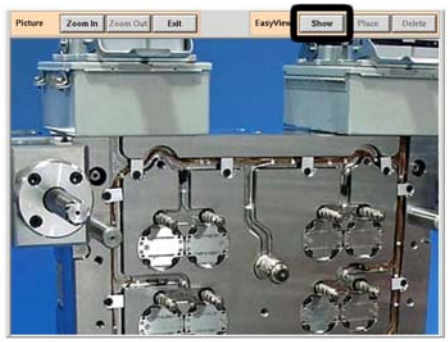
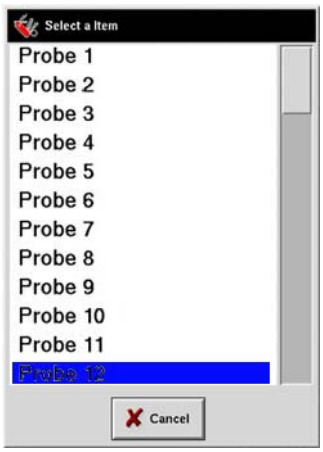
1. Select the Cavity zones	
2. Touch [**Set**]	
2. Set the Values	
3. Touch [**Enter**]	

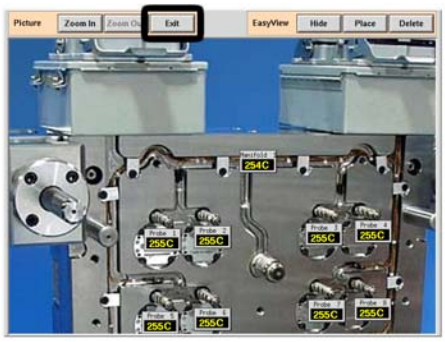
Saving everything to a Tool Bank

1. Select the Tool store page	
2. Select the new tool named earlier (see page 24	
3. Touch [**Save**]	

Setting up EasyView Pages

Step	Process	More…
1. Prepare and load an image	Select a picture or drawing of the tool and save it to a memory card	Do this on a PC away from the Console.
2. Import the image	Get the picture into the picture page	See page 88 for details
3. Select the tool	Open ToolStore and load the appropriate tool	
3. Select the picture	Open picture page and select the tab for the new picture. *There are 20 picture slots and 200 tool slots – one picture can be used for more than one tool*	
4. Attach the image	Touch [**Attach**]	

5. Configure the EasyView Image	Open the picture. (Touch [**View**] or the picture thumbnail)	
	Touch [**Show**].	
	Touch [**Place**]	
	Select a zone from the list	
	Touch the picture to place the minipanel Repeat these steps until you have placed all the required zones.	**NOTE:** To move a minipanel drag it to another location. To remove a minipanel touch [**Delete**] and select zone to remove.

5. Configure the EasyView Image (contd)	Touch [**Exit**] to finish	
	Open the EasyView Page to see results	

Setting up other Utilities

System Page

Software Date

The System page has a date to show which software version is loaded and it is automatically reconfigured if ever the software is upgraded. It is helpful if you make a note of the Software version date before you contact your supplier with any technical query.

Passwords Options

Three levels of Password control

If the User Password option (see page 38) is set to [**Enabled**] then there are three levels of control…

1. Open Level - includes some limited functions that need no password such as searching the event log or exporting performance data.
2. User (or Level 1) password which gives low level access to:
   - switch the tool on and off,
   - alter temperatures,
   - select different tools
3. System (or Level 2) password which gives high-level access to:
   - all user-level functions,
   - set the user password,
   - re-configure the settings for a new tool,
   - store and load new tool settings to/from the disc

Two Levels of Password Control

If the User Password option is set to [**Disabled**] then all functions that normally need a User (Level 1) Password become Open level.

Higher level functions that require a System (Level 2) password retain their Password protection.

About password active times

After you key in a password, access is possible while you continue to input data. Each key-touch resets the timer but, when no more input is detected, it times out and then denies unauthorised access. This is the same for both User (level 1) and System (level 2) passwords.

If, while the System password is active, you visit a lower level page that only requires User (Level 1) password level (eg Display) or none at all (eg Graph) then the System password will expire after 20 seconds but, on doing so, it becomes a User (Level 1) password which would allow you to continue setting lower level parameters.

Password Application Table

The Password Application shows the default level of password that is required for various functions on the different screen pages. Other options including “Allow Set Zone Off”, “Tool Password” and “User Password” may alter some levels of control.

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Page/Screen	No Password required to use	Level 1 (User) password required to use:	Level 2 (System) password required to use:
Display	Change Display options. Go to Zoom page	Run/Stop/Change Modes. Set (Alter temperatures or modes) Turn zone “On” & “Off” *	
EasyView	Change Display options	Set (Alter temperatures or modes)	
Zoom		Set (Alter temperatures or modes)	
Graph	All functions (including TimeLine) are basically read-only		
Picture	Load/Save/Delete Modify EasyView layouts		Attach/Detach pictures to Tools
ToolStore		Load	Save, Backup, Restore, Delete, Detect * *See “Tool Password” on page 38*
Utilities – System	Set, Change Time		Change Passwords and Password Timer
Utilities – Printer			Select Printer type and paper sizes
Utilities – Event Log	Any Searches		
Utilities – Network	Enable. Disable Obtain IP address		Change Network Names, Address, Mask
Utilities – Export	Any Export function Backup auto archived history Data		
Utilities – Remote	View VNC at Full or Part Window		Configure VNC Settings
Utilities – Quad IO			Configure any Input or Output channel
Test Page	Select zones to be tested	Start Test	Configure Test
Setup			Set, Config, Change values

Password Security

Every machine leaves our factory with two levels of password protection (these are provided on a detachable page at the front of the Manual). We recommend that you change these, as soon as possible, to establish your own security.

Setting Passwords

On the Utilities > System Page

System Password

1. In the System box touch [**Edit**] to display the Keyboard entry window.
2. First establish your authority by entering the System password.
3. Next, enter your new System password.
4. Finally, re-enter your new System password to confirm it.

User Password

1. In the User box touch [**Edit**] to display the Keyboard entry window.
2. First establish your authority by entering the System password.
3. Next enter your new User password.
4. Finally re-enter the new User password to confirm it.

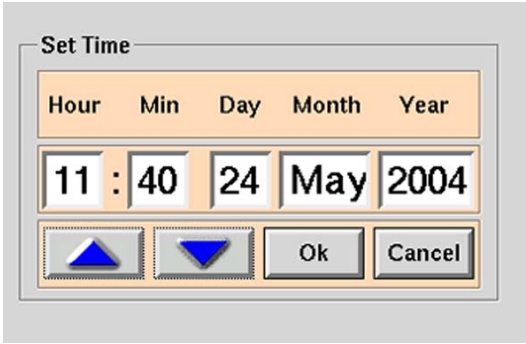
Setting your password timer

1. In the Time Limit box touch [**Edit**] to display the Keyboard entry window.
2. First establish your authority by entering the System password.
3. At the Password Timer keyboard enter your preferred elapsed time in minutes and touch Enter.

Password Override

To override the User and System Password control, set the Password Timer to "99". This setting negates the need to enter a Password at any of the usual checkpoints such as Load Tool or Temperature Change.
However, you still need a Password input in order to Change a Password.

Setting the System Time and Date



We recommend that you set the correct time and time zone so that you may take full advantage of the software features that use the time function.

1. Enter the Set time area by touching the System tab.
2. In the Set Time box, touch the time element that you wish to change.
3. Use the [**up**] and [**down**] buttons to set the required value.
4. Select [**OK**] to save the new setting to the system.

Print Page

Using a locally connected Printer

1. Use the Printers list to select the printer that you intend to use. If a precise match is not available then select something similar since most similar printers share drivers.
2. Click on the Connection [**Edit**] button and select the Local USB option.
   (NOTE: The Local/Remote option is not available on the TS console)
3. Select standard European [**A4**] or American [**Letter**] size.
4. Touch [**Accept**] to confirm your printer selection.

Using a remote Network Printer

1. Use the Printers list to select the printer that you intend to use.
2. Click on the Connection [**Edit**] button and select a network descriptor for your network.

   Network TCP (Transmission Control Protocol) a Standard Network communication protocol

   Network LPD (Line Printer Daemon) for a UNIX/Linux Network Protocol

   Windows SMB (Server Message Block) a communication protocol favoured by Windows networks.
3. Click on the Printer Address [**Edit**] button and key in the Local Area address for a known network printer. Alternatively, supply a resource name if your system uses a name server.
4. If your network uses the Windows SMB option then you must provide a printer name - click on the Share Name [**Edit**] button and key in the printer name which identifies the remote network printer.
5. Select standard European [**A4**] or American [**Letter**] size.
6. Touch [**Accept**] to confirm your printer selection.

Should you have any difficulties then contact your own IT department for help with LAN printer configuration.

Printing to a USB Memory Stick

A fifth option in “Connection” is [**Print to File**] which allows you to print out a file, in either a raster or pdf format, to a USB Memory Stick.

1. Click on the Connection [**Edit**] button and select [**Print to a file**].
   Note that the “Make” option greys out and the “Model” option changes to “File”.
2. Click on the File [**Edit**] button and select [**JPEG**], [**PNG**] or [**PDF**]
3. Use the USB port and a USB Memory Stick as a transfer media for making prints from any other pages. (see page 97 for details)

Event Log and Export Pages

Event Log is used to store and retrieve recent events and is explained more fully on page 67.

Export is used to collate running data and is explained more fully on page 98 .

Networking, Remote and Quad IO pages

These three pages may be used to connect your controller into a wider system that allows remote interfacing.

They should only be configured by competent IT staff who are familiar with networking protocol or machine interface.

Should you need further information please contact your supplier.

Running your controller

This section of the manual is divided into four main areas that are concerned with:

- the basic Starting and Stopping along with Boost and Pause controls.
- changing temperature settings while the controller is running.
- inspecting historical graphs and event logs to trace back how the controller has behaved over the last 5 or 30 minutes, or even the last 24 hours.
- recognising what alarms may be generated, what they mean and what to do about them.

What is included in this section

Controlling Zones – Starting, Stopping and more

Using the Display Page to control and monitor temperatures

Using the Easy-View page to control and monitor temperatures

Using the Purge Option

Looking at temperature history for the last 5 to 30 minutes

Looking at temperature history for the last 24 hours

Checking the log book for past events

Alarms - what alarms may be seen on the controller.

Control Modes for all zones (from the Display Page)

Operation	Available by	Description
RUN	Button One or Mode Button	Switches on all zones
STOP	Button One or Mode Button	Switches off all zones **NOTE:** Selecting Stop does not remove voltage from the heaters; it switches off by setting all the target temperatures to Zero. Do NOT try to change fuses or disconnect units while in this mode.
STANDBY	Button Two or Mode Button	Reduces the temperature of all zones that have any Standby Temperature configured on the Setup page. Temperature remains reduced until RUN command is given.
STARTUP	Button One or Mode Button	STARTUP Initiates a starting sequence that is configured on the Setup Page. MASTER-FOLLOW – Applies power to Master zones then adjusts other zones' Set Temp to follow Master Zones' Actual Temperature – produces a homogenous heat rise. MASTER-ONLY – applies power to Master Zones but waits until they are at full temperature before switching on all others. STAGED – applies power to nominated stage zones and then waits until they reach normal temperature before switching on next stage zones. This cascades the startup sequence through several stages. SECOND STARTUP When all the zones have reached their set temperatures the system then goes into SECOND STARTUP mode which may be configured to either: RUN – maintain their Set Temperature BOOST – temporarily raise the temperature and then settle back to normal Set Temperature. STANDBY – lower zone temperatures until Run command is given.
SHUTDOWN	Button One or Mode Button	Initiates a switch-off sequence that is determined by the startup mode. ***With the Startup Mode set to Master-Follow or Master-Only*** Shutdown switches off the nominated master zones then adjusts all other zones' Set temperatures to the manifold Actual temperatures. The whole tool then cools in a homogeneous manner. ***With the Startup Mode set to Staged*** Shutdown consecutively switches off the zone groups in timed intervals and in the order as nominated by Shutdown Stage configuration. When the Shutdown sequence finishes then the system goes to STOP mode
BOOST	Button Two or Mode Button	Temporarily raise the temperature of all zones that have any Boost Temperature configured on the Setup page. When the boost period expires then zone temperatures return to normal Set levels.
PURGE	Mode Button while in Run	This is a preset Purge sequence to help you change colour in the mould tool. (For details about this option read "Using The Purge Sequence" on page 63.)

Control for individually selected zones

Operation	Available by		Description
STOP	1) Select Zone 2) Touch [**Set**] 3) On keypad, touch [**OFF**]		Switches off the one zone
BOOST	1) Select Zone 2) Touch [**Set**] 3) On keypad, touch [**BOOST**]		Temporarily raises the temperature of the selected zones until Boost Time expires.

More about using Boost

- Boost mode is determined by two quantities that determine boost – the boost temperature and it's time.
- Boost Time that takes precedence over boost temperature. Once the boost period expires then the extra heating power is removed regardless of whether the zones actually reach the configured Boost temperature.
- Boost raises the temperatures of only zones that have any boost temperature configured.
- Boost mode is only available while the system is in Run mode
- The Boost Command may be received locally through the console interface or remotely via the remote console interface or the Quad I/O Card.

Manual Boost display

When a Manual Boost command is given, the Mode window shows "**BOOST**" in black letters on a yellow background. The BOOST message displays until Boost-Time period expires after which the zones returns to normal set temperature and the Mode Window shows RUN.

Remote Boost display

When a boost Command is received from an external source the Mode window shows M/C BOOST as black letters on a white background. The time that the message displays for is dependent on the external signal.

Brief Signal - If the external signal is brief for example, it lasts 1 second, and the Boost Time is set to something longer, perhaps 3 seconds, then the nozzles are boosted for 3 seconds after which they return to normal level. The M/C BOOST signal is also displayed for 3 seconds after which it returns to RUN.

Long Signal - If the Boost Time is set to 3 seconds and the external signal lasts for 4 seconds, then the nozzles are boosted for 3 seconds and then return to their nominal value. However the M/C BOOST message in the Mode window displays for 4 seconds (while the external signal is present) even though no boost current is being applied for the last second.

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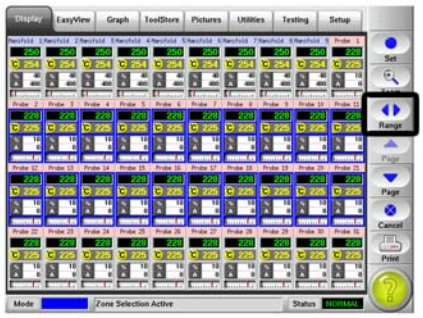
Using Display Page to change Temperatures

1. Select the desired zones.	
2. Touch [**Set**].	
3. And then: To **Set** a new temperature - Touch [**Set**]. To **Raise** the overall temperature - Touch [**Add**]. To **Lower** the overall temperature - Touch [**Subtract**].	
4. Enter the Temperature setting or change	
5. Touch [**Enter**] to make the setting or [**Esc**] to defer the action.	

Using the Display page to change Modes

1. Select the desired zones, (this automatically changes the function keys from Global to Zone).	
2. Touch [**Set**] to display the keyboard.	
3. And then: a) To change to **Manual** - Touch [**Manual**]. b) To **Slave a zone** - Touch [**Slave**]. c) To **return to Auto** - Touch [**Auto**].	
4. a) for **Manual** enter the **Percentage power** b) For **Slaving** select a similar **master zone** from the Zone list. c) For **Auto** enter the required **zone temperature**	
5. Touch [**Enter**] to make the setting or [**Esc**] to defer the action.	

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More about Slaving Zones

There are several points that you should remember when using zone slaving.

1. **You can only slave like zones for like zones**. - You cannot slave a probe zone to a manifold zone.

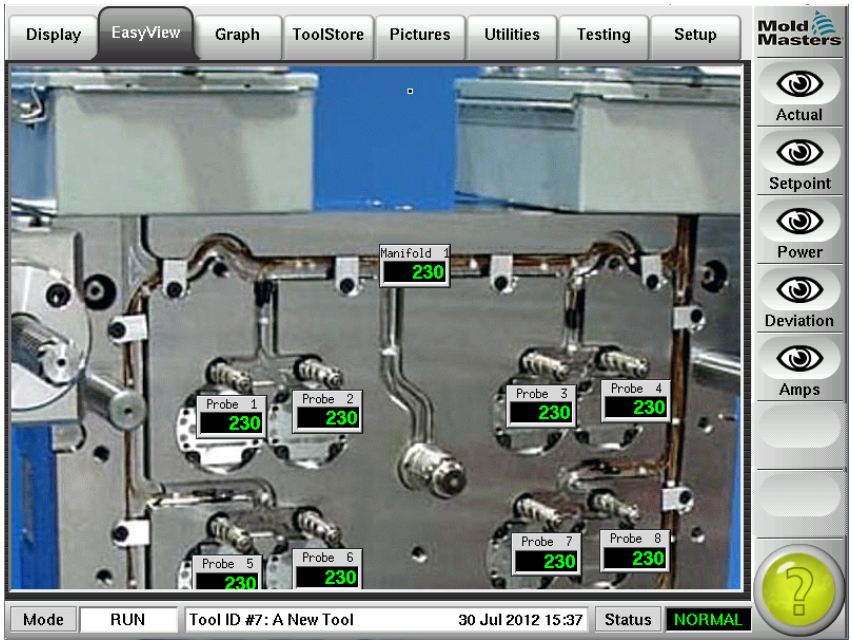
2. **You cannot nominate another zone that is already slaved to another**. - If, for example, zone 2 is currently slaved to zone 3, you cannot slave zone 1 to zone 2. The leading zone must already be a healthy zone.

3. **You cannot nominate a zone that creates a loop**. - If, for example, zone 2 is slaved to zone 3, then you cannot slave zone 3 back to zone 2.

4. **When selecting a lead zone to slave to you should find a similar zone type that is currently operating at the same temperature and at the same power level**. - If you nominate a lead zone that is working at the same temperature but outputting a noticeably different power level then the slaved zone may not regulate efficiently.

About EasyView page

The EasyView page allows you to relate zone temperatures to physical position.



Apart from the zone (alias) name, the mini-panels show one other piece of information which may be either:

- the Actual temperature,
- the Setpoint temperature,
- the current Applied power,
- the deviation between Set and Actual temperatures
- the current (or Amps) consumed by that zone

While no zone is selected, you can change the displayed value by touching one of the [**Actual**], [**Setpoint**], [**Power**], [**Deviation**] or [**Amps**] buttons at the side of the page.

Touching any one mini-panel within the EasyView page causes the sidebar function buttons to switch to [**Set**] and [**Zoom**] in readiness for your next input.

The Mini-panel header is not colour-coded as on the Display page. However the lower half, while showing Temperature or Power is colour-coded to indicate the alarm status, i.e.

Green on Black	**Normal working**
Black on Yellow	**1st stage Warning status**
White on Red	**2nd stage Alarm Status or Fatal Error**

Using EasyView to change temperatures

1. Select the desired zones.	
2. Touch [**Set**].	
3. And then: To **Set** a new temperature - Touch [**Set**]. To **Raise** the overall temperature - Touch [**Add**]. To **Lower** the overall temperature - Touch [**Subtract**].	
4. Enter the Temperature setting or change.	
5. Touch [**Enter**] to make the setting or [**Esc**] to defer the action.	

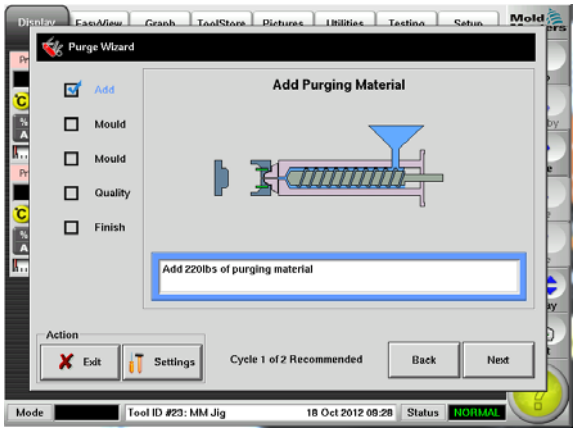
Using EasyView to change Modes

1. Select the desired zones.	
2. Touch [**Set**].	
3. And then: a) To change to **Manual** - Touch [**Manual**]. b) To **Slave a zone** - Touch [**Slave**]. c) To **return to Auto** - Touch [**Auto**].	
4. a) for **Manual** enter the **Percentage power** b) For **Slaving** select a similar **master zone** from the Zone list. c) For **Auto** enter the required **zone temperature**	
5. Touch [**Enter**] to make the setting or [**Esc**] to defer the action.	

Purge sequence

The purge mode is only available while the tool is in Run Mode and has two different modes:

Mechanical



Mechanical purge is a passive sequence that gives the operator four programmed steps to expel one colour and then introduce a new different colour.

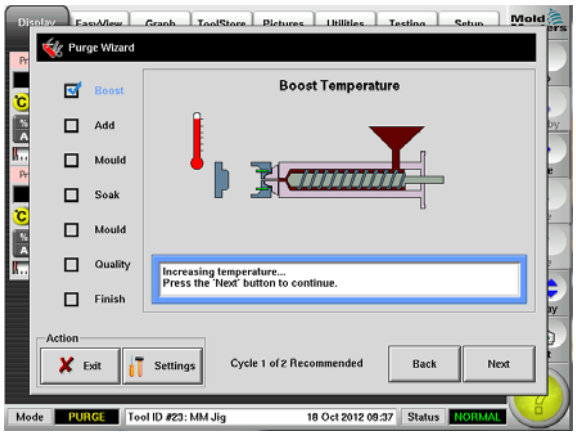
After you select [**Purge**] from the [**Mode**] drop-down, the screen changes and guides you through the four steps. Each step tells you to perform a preset action after which you can touch [**Next**] to move on to the next stage. Eventually it asks whether the quality of the new colour is acceptable.

Answering [**No**] takes you back to the beginning to run the sequence again.

Answering [**Yes**] closes the purge screen and returns you to the main Display page.

You may exit the Purge wizard at any time by touch [**Exit**] at the lower left of the Wizard screen.

Chemical.



Chemical purge is a combination of active and passive sequence. It is a preferred sequence to use a proprietary purge agent.

After you select [**Purge**] from the [**Mode**] drop-down, the screen changes and guides you through the seven steps.

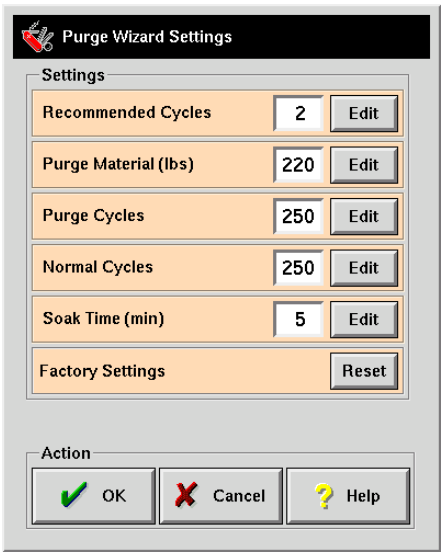
It goes to 'Boost' temperature as soon as the purge sequence is started and overrides the normal Boost Time and holds the Boost temperature until you press [**Next**].

The next two steps or 'Add' and 'Mould' are passive and wait until the operator completes each action and touches [**Next**].

The 'Soak' stage is active and the controller will hold the mould at temperature for at least that preset 'Soak' time during which the [**Next**] and [**Back**] buttons are faded and inoperable. Once the timer expires the operator can touch [**Next**] and continue with the final 'Mould' and quality checks.

You may exit the Purge wizard at any time by touch [**Exit**] at the lower left of the Wizard screen.

Preset Purge parameters



You can set the Purge Parameters at any time while the Purge Wizard is on the screen. This picture shows the Purge Wizard settings at default value, and they are as follows:

Recommended Cycles – how many times the Wizard suggests you repeat the sequence if you do not accept the final quality.

Purge Material – the weight of purge material you wish to instruct the operator to load.

Purge Cycles – the number of cycles you wish to instruct the operator to run to expel the first or purge material.

Normal Cycles – the number of cycles you wish to instruct the operator to run to load the new colour material.

Soak Time (Only available when Chemical Purge is active) – the wait period that you wish for the operator to hold the purge material in the barrel and mould.

Factory Settings - the default settings that you can re-select at any time.

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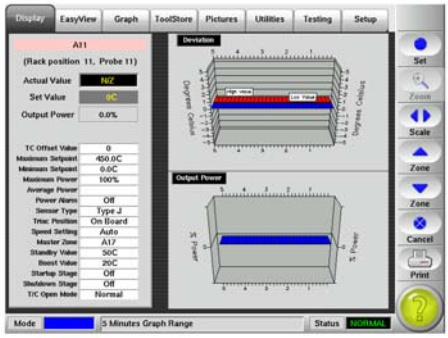
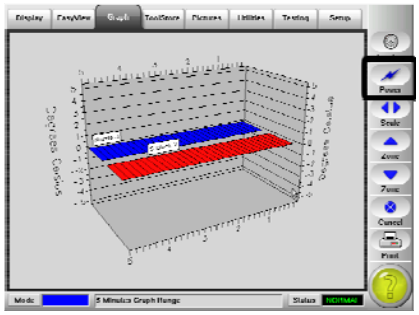
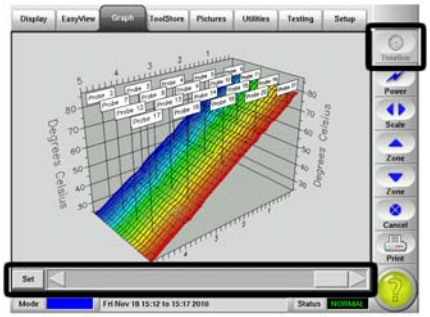
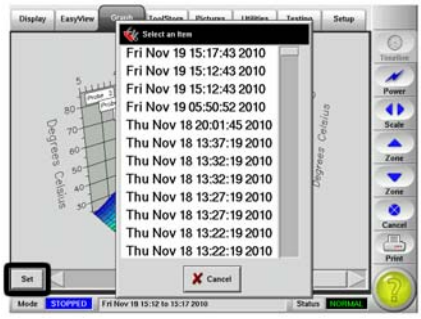
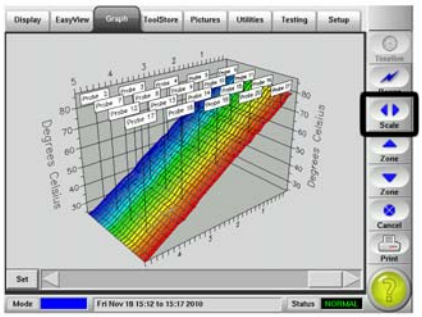
Check zone past performance (graph)

Your controller can record and display the temperature history for any zone over a period of time.

Inspecting the last 5 or 30 minutes

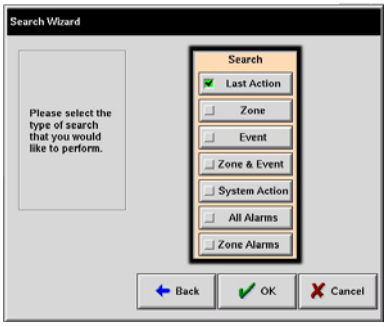
Select any zone	
Touch [**Zoom**]	
The Zoom page shows	a) The table on the left shows the main settings for the zone and the current temperature value. b) The upper graph on the right shows how measured samples of the actual temperatures have varied above (red) and below (blue) the set point over a period of time. If the two lines are running close together, then you have precise temperature control. If, however, any zone shows a noticeably wider deviation than its neighbours, it could indicate potential problems. It could be a noisy thermocouple input that may be due to poor connections or a faulty thermocouple. Temperature control could also suffer if you manually select the wrong speed setting for a zone response rather than using the automatic choice. c) The lower of the two graphs shows the output power levels that have been measured over the same period of time. Power traces should be fairly similar for similar zones at similar temperatures.
Touch [**Range**]	To toggle the view from 5 minutes to 30 minutes
Touch [**Up**] or [**Down**]	To select adjacent zones

Inspecting the last 24 hours

Select up to 20 zones and open the [**Graph**] page.	
Use [**Pow/Temp**] button to toggle the display to show a recent trace of either temperature or power.	
Touch the [**Timeline**] to activate the slider bar at the bottom of the page. Scroll to select time and date (*which is displayed in Message bar*).	
Touch [**Set**] to select a listed time period	
Touch [**Scale**] to toggle the view from 5 minutes to 30 minutes	

The Event Log Page

This page enables you to look-up what operational changes have been made to the controller, or its configuration, and when they were done. It is a permanent on-line diary and it logs the last 40 events or changes that have happened.

1. Open the **Utilities** page and **Event Log**	
2. Open the **Event Log** sub-page and touch [**Start**]	
3. Select a search pattern	

Last Action	shows all past actions chronologically
Zone	searches for past actions that have occurred within a specified zone
Event	searches the past actions for occurrence of a specified event type
Zone & Event	searches past actions for a particular combination of specified zone and specified event
System Action	searches for occurrences of a specified global action.
All Alarms	searches and returns all alarms that have occurred on any zone
Zone Alarms	allows you to first select a zone then searches and returns all alarms that have occurred on that particular zone.

All search results are displayed in the Events Log page window and the [**Next**] button shows more results if they are available.

Alarms

Whichever page may be active; there is a common Mode and Status window at the bottom of the page.

If your controller is switched on and running normally then the left hand Mode window will show RUN (as black text on white background) and the opposite Status window will show NORMAL (as green text on black background).

Mode Window

If the controller is manually switched out of RUN mode then the Mode window shows the selected function, and is seen flashing, on and off.

The table below lists the different displays:

RUN	**Black text in White box**	All control zones are working normally
STOP	**White text in Blue box**	The System has been shut down and the heaters are at room temperature.
STANDBY	**Yellow text in Black box**	Any zones with Standby Temperatures configured have been reduced in temperature until the next command is given.
STARTUP		The system has been started in a homogenous or staged heat-rise. It will switch to RUN when working temperature has been reached.
SHUTDOWN		The system has been shut down in a homogenous or staged heat fall. It will switch to STOP when room temperature has been reached.
BOOST	**Black text in Yellow box**	Any zones with Boost Temperatures configured are being temporarily raised. (manual request)
M/C BOOST	**Black text in White box**	Any zones with Boost Temperatures configured are being temporarily raised. (machine request)

Status Window

The right hand Status window shows NORMAL if all the zones are at their set temperature and no faults have been detected. If any zone detects a fault then the Status window changes its display and colour as detailed below:

NORMAL	**Green text in Black box**	Controller is running normally
WARNING	**Yellow text in Yellow box**	A zone's Temperature exceeds the warning limits
ALARM	**White text in Red box**	This shows either a Fatal Error or a zone's temperature exceeds alarm limits

Note that the status alarm is only active when in Run Mode – so systems whose temperature rises slowly, such as a Master-follow, will not raise spurious alarms. Once they switch over to Run mode at their set temperature then the alarm becomes active.

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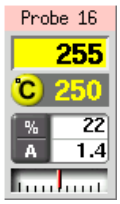
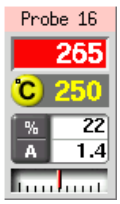
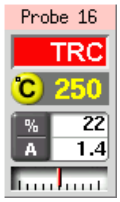
Identifying Zone alarms

Normal Zone This shows a healthy zone		Green text on Black background
Warning Zone This shows a first stage warning		Black Text on Yellow Background
Alarm Zone This shows a second stage alarm		White text on Red Background
Fatal Error an abbreviated Error message. (for a list of all Error messages see page 107)		White text on Red Background

Beacon and Sounder extension

A Beacon and Sounder extends any second stage temperature alarm or fatal error alarm. Curing the alarm condition automatically extinguishes the beacon/sounder.

A key switch is also provided to mute the sounder at any time. Note however, that no reminder is given to show that the sounder is muted when the system is healthy. Re-occurrence of subsequent alarm conditions will cause the beacon to light but not create an accompanying audible alarm.

Card Indicators

Zone Control Cards also have their own LED indicators that give a state-of-health display and which can be seen through the cabinet windows.

SCAN – this LED flashes briefly as the controller interrogates each card in sequence.

FUSE – Should normally be extinguished. It lights to show that an output fuse has failed.

TC – Should be normally extinguished. It lights to show that the card has detected an open-circuit fault on the thermocouple circuit.

GF – Should be normally extinguished. It lights to show that the card has detected a ground fault on one of the zones controlled by this card.

LOAD (L1 to L2/L6) - The Load LED(s) should also be normally lit, and a pulsing appearance shows that there is a regulated supply being delivered to the load.

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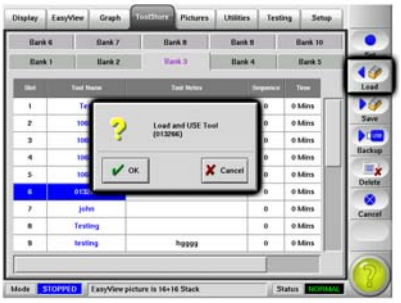
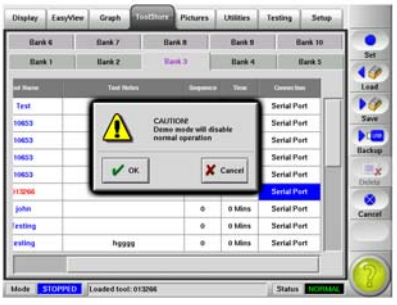
Training and Demonstration Mode

Your controller has a “Demo Mode” that can be used for training or demonstration purposes. While this mode is engaged, the controller will not communicate with the associated Controller Cabinet therefore we recommend that you ensure that the system is idle before using the Demo Mode Facility.

About Demo Mode

Demo Mode feeds every zone, within the selected tool, with a stream of pre-recorded temperature data. The Console appears to be working and it gives a real trace when Graph page is selected.

Selecting Demo Mode

Open the Tool Page to select and load any tool. (Note its current Connection setting)	
Touch [**Connection**] and then [**Set**]	
In the Select-Item option touch [**Demo Mode**].	
Accept the warning that this option will disable the Console.	

De-selecting Demo Mode

Taking the console out of Demo mode is a simple reverse of the Selection routine.

Select the current tool. Touch [**Connection**], and [**Set**].	
Select the original setting that was noted at Step 2 while selecting Demo Mode above).	

Customising your controller

Your controller has a dedicated Tool Bank which enables you adapt it quickly to different circumstances. It has two hundred available positions that can be individually configured, named, saved and recalled whenever the tool or job changes.

There is also a Picture page that can hold up to twenty various images that may be useful for operation or maintenance. One image may be dedicated to EasyView, while others may be reserved for photographs, diagrams or even tabulated data.

The most common add-on seen in a high proportion of our controllers is the 4-channel Input-Output card which provides an effective means of communicating your controller with other mould-related equipment.

What is included in this section

Using the ToolStore Page

Creating a new Tool

Renaming an Existing Tool

Loading Tool settings (Locally & Remotely)

Saving Tool settings

Deleting a Tool

Backing-up Tool Settings

Restoring tool settings

The Picture Page

The Quad I/O Card

Using the Tool Store page

Two rows of Tool Bank buttons allow you select 10 different tool banks, each of which contains twenty tool slots; this gives a capacity for up to 200 different tool settings.

Note that the tools are numbered from 1 – 200 sequentially through the pages. This ensures that individual tools can be identified when called for remote loading. This is detailed in the IO5 card description on page 93

The lower window shows the following details for the tools.

Tool - the tool number (not user-configurable)

Name - a user configurable text field for tool name.

The colour of the name is a key that shows the state of tool:

black - a tool store that has been named, but holds no settings.

blue - a tool that has been saved and named, but is not in current use.

purple - the tool that is currently in use and that has no changes to any settings.

red - the tool that is in current use but which has been changed from its stored settings.

Description - a user-configurable text field that may be used to hold an expanded description of the tool.

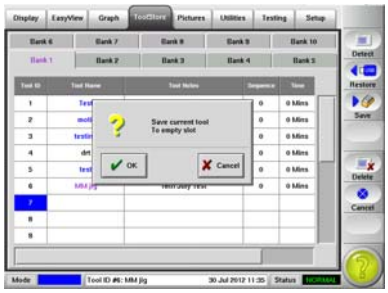
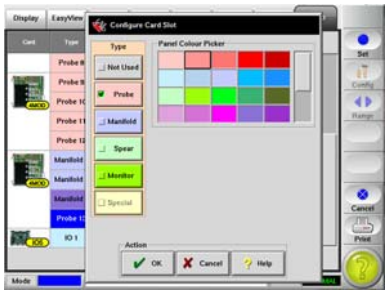
Sequence – a sequential order that allows you to run a series of tools or tool settings in a preset and set duration sequence. When Tool Sequencing is not used then it defaults to 0 to be non-active

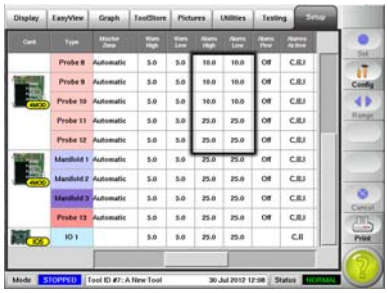
Time – is used as part of the sequence configuration to set the time for which any sequence step is held. See page 86 for more detailed information on these two parameters.

Connection - this normally defaults to Local Serial which indicates that the tool settings are stored locally within the console memory. However, if the console is networked, and thus connected to two or more controller cabinets, this may show the name of one or more remote HRC-NET cards. The Connection column also provides a demo facility as described on page 71.

Creating a new tool

If you need to have different tools to use for different applications then you will need to create a new tool to hold alternative settings.

By way of an example, a tool with four QMOD cards is currently set here as a 10-Zone tool with two manifolds. It needs an alternative tool setting for twelve zones with manifolds, bridge and a sprue.	
The first step is to save the current settings to a blank tool slot.	
And then name the new tool.	
Next open the Setup Page	
Select the spare un-used zones and reallocate them	

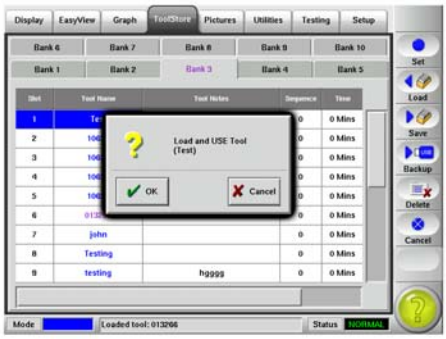
You can allocate function (probe or manifold) and you can also use the colour-picker to show a different zone type. Use [**Alias**] to provide different names to identify the new Bridge and Sprue zones	
While on the Setup page scroll along and check whether you need to adjust any other settings. For instance this part of the table shows the default for probe alarms does not match the existing settings – you can set them to match while still on this screen.	
Return to the Display page to see the new tool layout. It shows the new zones that need their set temperatures adjusted. Select one or more of the new zones and touch set.	
Use the key pad to set the zone temperature	
Finally see the new tool setting ready to use.	

Renaming an existing tool

Touch the relevant tool tab.	
Touch the [**Set**] button	
Edit the name	
Touch [**Enter**]	

Loading tool settings (locally)

Note that the operating mode for the controller cabinet remains unchanged by loading a tool. So, if your controller is in Run mode and another tool setting with different temperatures is selected, and loaded, then the tool will immediately change to run at the different temperature settings.

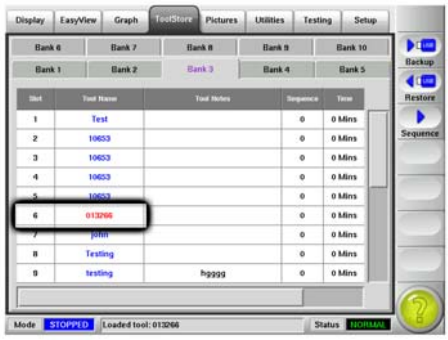
Select the desired tool.	
Touch [**Load**]. (If the [**Load**] button is greyed out then swapping Tools on-the-fly has been Disabled - See "Allow ToolLoad" page 36)	
Touch [**OK**] (or [**Cancel**] to exit)	

Loading tool settings (remotely)

If the controller is fitted with an IO5 card then it is possible to remotely select different tools. See page 93 in “Customising you controller” for information about how this works.

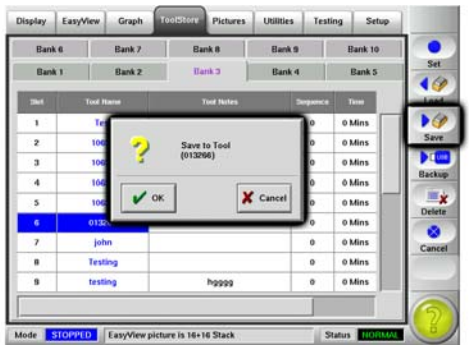
Saving tool settings

If you change tool settings and want to save them, then you have two choices.



1. Over-writing the last settings with new saved settings

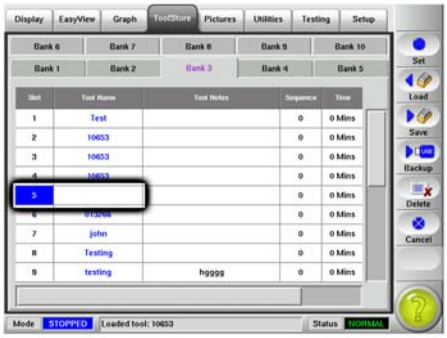
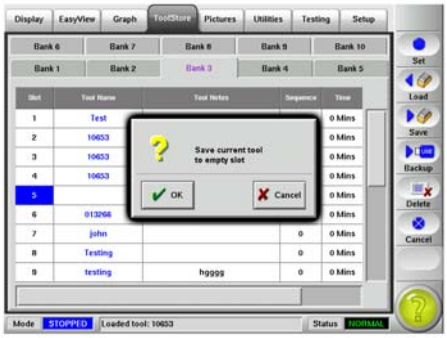
If you know that the new settings are satisfactory, then you can save them back into the same tool store.

Select the tool	
Touch [**Save**] and [**OK**]	

Saving tool settings

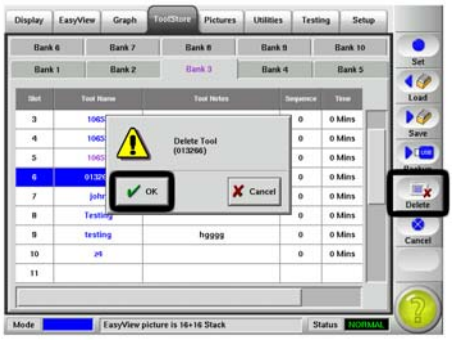
2. Saving modified settings, without losing existing ones

If you have changed some tool settings and want to keep them but at the same time you wish to retain the old unmodified settings then you must create and save into a new store as follows:

Select a spare blank tool tab	
Touch [**Save**] and [**OK**]	
Enter a new tool name and touch [**Enter**].	

Deleting a tool

Once you have deleted a tool there is no way to recover its previous settings. Take care that you are deleting the correct tool.

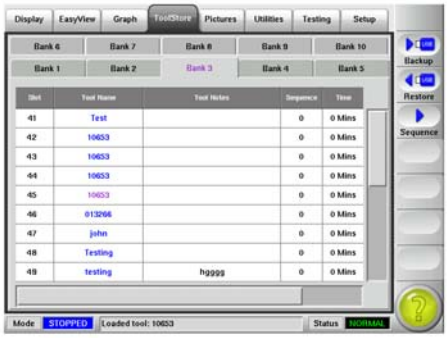
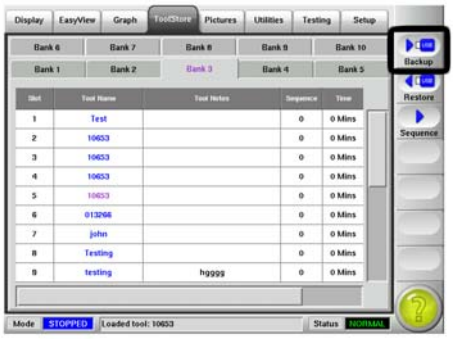
Select the unwanted tool	
Touch [**Delete**].	
Touch [**OK**]	

Backing up tool settings

Backing up tools is a means of saving tool settings to an external media which may be kept in a safe place for secure recovery or transferred to another controller for use elsewhere.

NOTE: If the particular tool has an EasyView image and EasyView page associated with it, then the Minipanel configuration is saved within this Backup procedure. However, you should save the same picture and keep the Picture and Tool files together if you wish to reuse them at a later date.

1. To save (backup) all the tools:

Open the ToolStore page	
Insert storage media then wait about 10 seconds until the USB Memory is ready to use.	
Touch [**Backup**]. The tool is saved to the memory stick along with “Tool Name” and “Tool Notes”.	
Wait about 10 seconds then remove storage media	

Backing up tool settings

2. To save (backup) one selected tool setting:

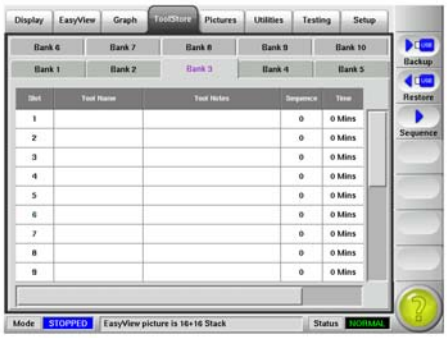
Insert storage media then wait about 10 seconds until the USB Memory is ready to use.	
Select the tool to Backup	
Touch [**Backup**]	
Wait about 10 seconds then remove storage media	

Restoring tool settings

If there is any information stored in a selected tool bank or slot then this process over-writes new information into that position.

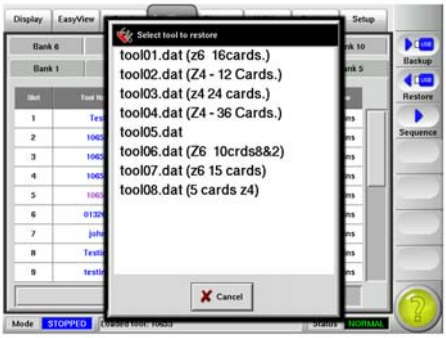
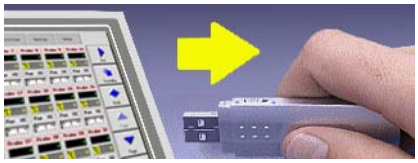
There is an option within this sequence to restore either all of the stored tools or just one selected tool.

1. To Restore all the Tools

Open the ToolStore page.	
Insert the storage media with the data then wait about 10 seconds until the USB Memory is ready to use.	
Touch [**Restore**],	
Wait about 10 seconds then remove storage media	

Restoring tool settings

2. To Restore a single Tool

Insert the storage media then wait about 10 seconds until the USB Memory is ready to use.	
Select the tool tab	
Touch [**Restore**]	
If the console sees more than one tool setting on the memory card it displays a “Select Tool” option for you to choose which particular tool you require.	
Wait about 10 seconds then remove storage media	

Sequencing Tools and Settings

The combination of Sequence and Time columns gives you the flexibility to run a preset sequence of events that you may require for special tool runs.

One possible use, shown here, would be to copy the same tool into a few slots and then make separate adjustment for each occurrence and run them in sequence. For instance it may be desirable to first heat up the manifolds only to a lower start temperature. Once that has been allowed to settle you could then pick a second sequence which would bring them up to normal temperature and then maybe a third and fourth which would switch on all the zones at normal temperature and put them into Run mode.

Effective startup sequence from this example

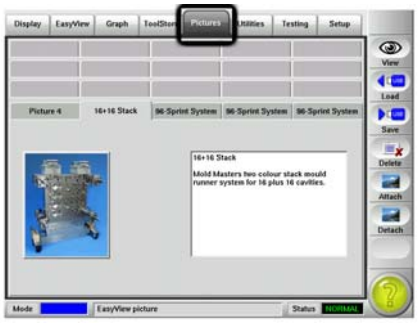
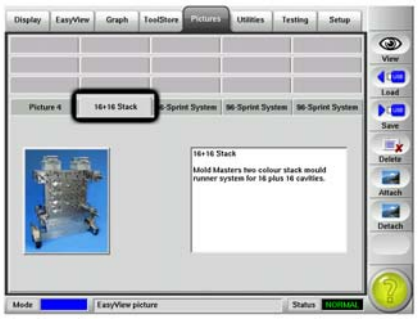
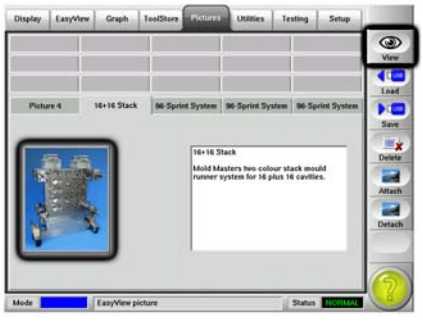
Sequence 1 The Tool l with manifold set at just below run temp and all other zones turned off is loaded. The [**Start**] button is displayed for you to initiate the sequence from this page. The sequence timer holds this condition for 60 minutes and then steps to next sequence	
Sequence 2 All other zones remain off while manifold rise to normal temperature. The sequence timer holds this condition for 10 minutes then steps to next sequence.	
Sequence 3 The Tool setting with Probe zones switched on set to normal temp loads. The Probe zones start to heat up. The sequence timer holds this condition for 15 minutes and then steps to next sequence	
Sequence 4 The tool setting with all zones including cavity and water temp monitoring switch on once the nozzle zones have had enough time to reach normal temperature. The tool assumes “Run” mode after last sequence has been engaged.	

The Picture Page

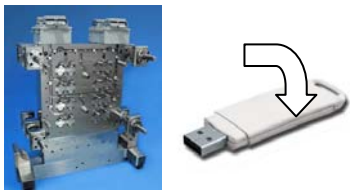
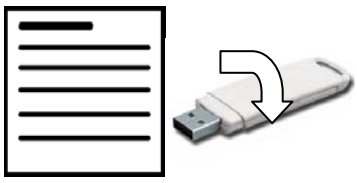
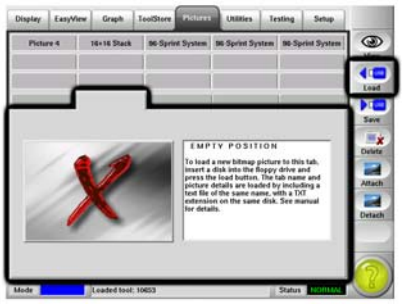
The picture gallery has the ability to store up to 20 images that can be displayed at full screen size. Explanatory notes may accompany each picture; if so they are displayed alongside the thumbnail view of the image.

The Picture page is also used to configure Images for the EasyView page, though that process is fully described on page 45.

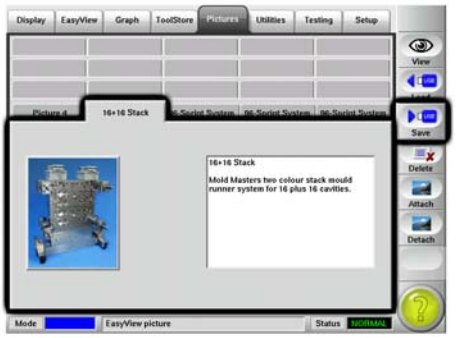
To view an image

Open Pictures page	
Select a picture tab	
Touch either the picture or [**View**]	
View picture	

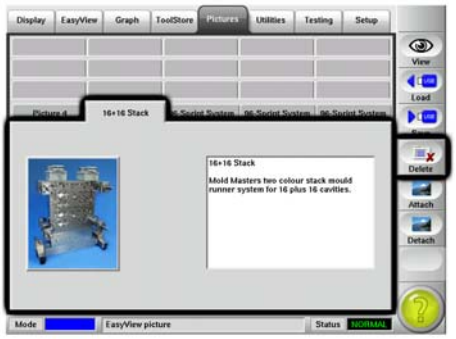
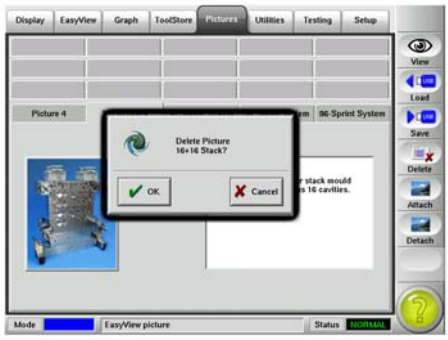
To load a new image

1) Save one or more pictures onto a USB Memory Stick. The Console can recognise most common raster image files such as jpg, .gif, tif. or png.	
2) Create associated text for each picture with a title then a blank line and then up to 150 words as extra descriptive text. Save them to the same memory stick as a txt, doc, or odt files with the same name as used for each picture. The console will automatically associate same named picture and text files	
3) Insert Media then wait about 10 seconds until the USB Memory is ready to use.	
4) Select an empty tab and touch [**Load**]	
5) Select one image from the list presented. The console will load the new picture and the associated text provided it sees a text file of the same name. If no text file is detected with the same name then it uses the name of the picture file as a title for the picture tab and in its description.	
6) View new picture	
7) To load more pictures go back to step 4 – touch another blank tab and [Load] then select any more pictures.	

To save an image

Insert storage media then wait about 10 seconds until the USB Memory is ready to use.	
Select the required picture and touch [**Save**]. Save more pictures at the same time by selecting them and touching save. If any picture has associated text, containing a title and description, it will also be saved at the same time.	
Wait about 10 seconds then remove storage media	

To delete an image

Select the unwanted image and touch [**Delete**]	
Touch [**OK**]	

The 4-channel Input/Output Card:

The following input/output functions are available on IO3, IO4 and IO5 cards. Extra tool selection function is available only with the IO5 card and is described on page 93.

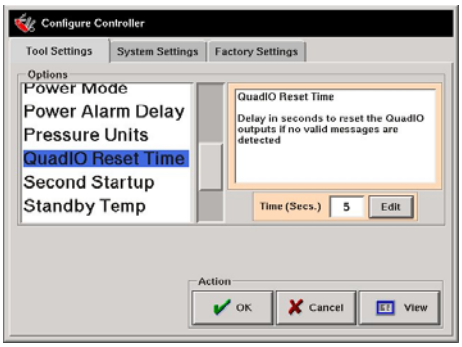
Interface - This is a digital Input/Output card that offers up to four separate inputs and outputs to facilitate remote interaction with the controller.

Setup is available on the Utilities page where you can pick [**Quad IO**] to see the four input and output options.

Display - The card has its own main page panel which show…

1) That it has healthy communications with the Console (shows N/Z is communications fail) If the IO card TC input is being used to monitor a temperature then it will be displayed here.
2) The set temperature is used as a monitor point rather than a control point. In this example the IO Input expects to see something at 22deg. Warning and alarm settings as above and below this set temperature.
3) The two digital numbers represent the state of inputs and outputs. They are read from right to left with Input above and output below.
   The example shown here shows an input seen on Imput1 and outputs generated on Outputs 1 & 2.

QUAD watchdog timer - The Quad IO Card has an internal reset mechanism which de-energises all output relays if it loses communication with the console. An option within the Config Tool Settings allows you to set that timer to respond according to your operating needs.



Inputs

Each Input circuit requires an incoming pair that is volt-free and normally open. The incoming pair must go to short circuit (or close) to trigger the required command.

Optional inputs that may be selected are as follows:

Option	Description
Inactive	This input will not be used and remains inactive
Run	Puts the Controller into RUN mode
Startup	Puts the Controller into STARTUP mode
Boost	Puts the Controller into BOOST mode
Standby	Puts the Controller into STANDBY mode
Shutdown	Puts the Controller into SHUTDOWN mode
Stop	Puts the Controller into STOP mode
Machine OK	When closed it allows console to go to Run or Startup Mode: If opened the console is put into “Stop” mode with resultant Mould Protect.
Passkey	Responds to an external Card-Key reader which is used to simulate User-level authentication. A Passkey input then allows any operation which would normally require a low-level (User) password.
Inj Confirm	This input is used to confirm that Inj Disable is functioning correctly. If Input is seen when no Inj Disable signal is given out then the system fails safe until the fault is fixed. A manual reset is then needed to unlock the controller.

Outputs

Each Output group is a single-pole changeover relay element that is rated at 240 volts, 1Amp maximum. It comprises a common or moving contact (MC) that is connected to a normally-closed (NC) contact when de-energised. When the controller activates any Output channel the normally closed (NC) and moving contact (MC) go to open circuit while the normally open (NO) and moving contact (MC) go to short circuit.

Optional outputs that may be selected are as follows:

Option	Description
Inactive	This output will not be used and remains inactive
Inj Disable	Output is seen if the system is idle. Output is cleared once the system has started up and gone into “Run” mode. Output is given if system has an “out-of-limits” alarm. (no other alarm eg Fuse of T/C causes Output to be given).
Inj Disable Ext	This output mimics “Injection Disable” in order to provide two identical outputs.
Controller Alarm	Output is given if ANY alarm is generated. This mimics the secondary output alarm (beacon)
Hot Runner	Hot Runner. Output is given if any probe(nozzle) or manifold deviates from its set point enough to generate a second stage Alarm
Temp Dist	An output is given if any Fatal Error occurs (eg Fuse or T/C etc)
Cavity Alarm	An output is given if any Cavity Zone (usually and RTD sensor) deviates from its Set temperature enough to generate a second stage Alarm.
Water Flow	An output is given if any Flow Sensor gives a flow reading that deviates from its nominal setpoint enough to generate a second stage Alarm.
Pressure Alarm	An output is given if any Pressure Sensor gives a pressure reading that deviates from its setpoint enough to generate a second stage Alarm.
Stopped	An output is given if the controller is automatically put into Stop mode by any detected alarm condition. (It is not activated if the controller is manually put to Stop mode by the user)
Boost	An output is given if the controller is put (locally or remotely) into Boost Mode
Warn	A new proposed output which will be given if any zone deviates from its setpoint enough to generate a first stage Warning.

Default Input/Output Selection and connector pin table

The standard interface is a Harting STA 20-pin female connector within an H-A16 housing.

Even though input/outputs channels may be individually configured to assume different functions, the default options are as shown in the following table along with the connector-pin configurations

I/O Connections

Description	STA 20 pin no.	Circuit	Default Input Function	Default Output Function
Input 1	1	Input 1	Go to RUN Mode	
Input 1	2			
NO Contact 1	3	Output 1		Injection Disable
MC Contact 1	4			
NC Contact 1	5			
Input 2	6	Input 2	Go to STANDBY Mode	
Input 2	7			
NO Contact 2	8	Output 2		Temperature Disturbance
MC Contact 2	9			
NC Contact 2	10			
Input 3	11	Input 3	Go to STARTUP mode	
Input 3	12			
NO Contact 3	13	Output 3		Boost
MC Contact 3	14			
NC Contact 3	15			
Input 4	16	Input 4	Go to STOP Mode	
Input 4	17			
NO Contact 4	18	Output 4		Spare/Inactive
MC Contact 4	19			
NC Contact 4	20			

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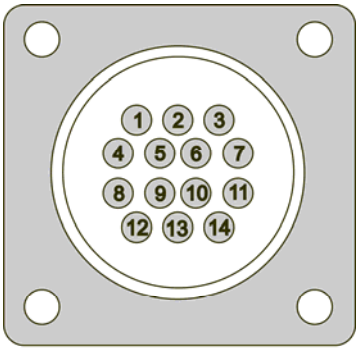
Using the IO5 card for Remote Tool Selection

The IO5 offers all the same functions of the 4-channel input/output card along with some extra input/output functions that enable remote tool loading. These extra functions connect to the remote machine via an AMP 183040 circular connector. The connector pins are configured according to the table below.

Pin	Function	
1	"tool load" signal from molding machine to ask console to load tool	
2	address 1	
3	address 2	
4	address 4	
5	address 8	
6	address 16	
7	address 32	
8	address 64	
9	address 128	
10	spare	
11	"Tool loaded signal" from console to molding machine	Normally-Open
12		Common
13		Normally-Closed
14	GND	



AMP 183040-1 Connector

Static or Dynamic Tool Loading.

The IO5 can be used in two ways to enable remote tool loading.

The static method is enacted by simply connecting appropriate "load" and "tool ID" pins to ground. The tool is loaded and feedback is ignored.

The dynamic method sends a change tool command by connecting the "load" and "tool ID" pins to ground – it then watches to see that a tool has been satisfactorily loaded and then ends the tool load process. It is also free to repeat the operation and load another tool should the need arise.

Static Remote Tool Load Process

If you want to load a tool without receiving console feedback then you can simply short appropriate pins together…

Load Tool 10 – connect, “load pin”, and “tool id pins” to ground - connect pins 1, 3, & 5 to 14

Load tool 19 – connect pins 1, 2, 3 & 6 to 14

Dynamic Remote Tool Load Process

This sequence allows a degree of control and feed-back. The procedure to remotely load another tool (in this example it will be tool 10) is as follows…

Step	Action	Remote Machine	Local Console	
1	Selects a Tool and Initiates tool load	Connects pins 14 (ground) to pins 3 & 5 (address 2+8 = 10) and pin 1 (“tool load”)	Console checks to see that it has valid tool settings in that tool bank.	
			If “no” then there is no change in “Tool Loaded “signal.	If yes then it disables “Tool loaded Signal” (pins 11& 12 go “Closed” while pins 12&13 go “Open”)
2	Console cannot find any configuration for selected tool	Machine sees that no tool change has occurred. It may flag an error to await operator intervention. **Process ends**	The Console displays an error message - “No Tool Found”	Process skips step 2 and goes to step 3
3	Console can find a tool and loads it	Waits for “Tool Loaded Signal”	Loads Tool 10 and indicates process is finished by enabling “Tool Loaded Signal” (pins 11 &12 go “Open” and pins 12 & 13 go “Closed”)	
4	Process Ends	Sees “Tool Loaded signal” from console and disconnects Pins1, 3 & 5 from ground (pin 14)	Console loses the “Change Tool” command	

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Maintaining your controller

Maintaining your controller is all about keeping it in order, checking records and settings and running self-diagnostic checks.

There are no user serviceable parts inside the Touch Screen controller and, in the unlikely event of equipment failure; you should return the unit for attention.

What is included in this section

Print Out Facility

Export Facility

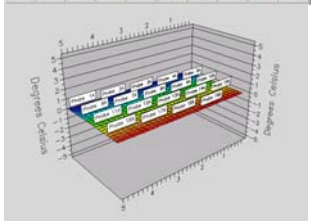
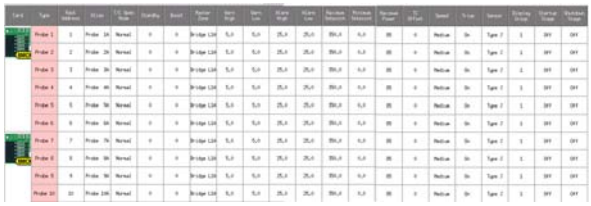
Self Diagnostic Tests

System diagnosis results

Upgrading

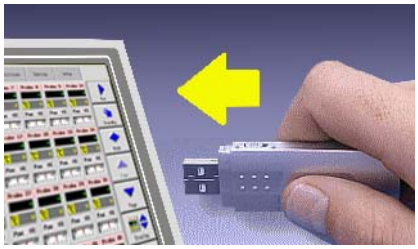
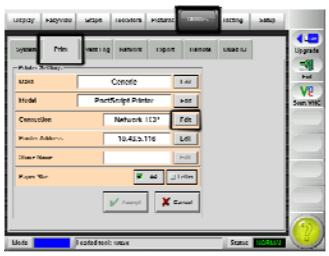
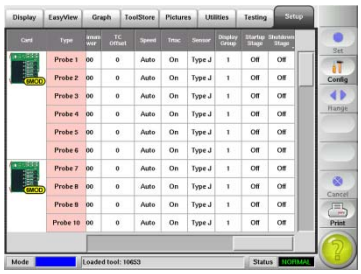
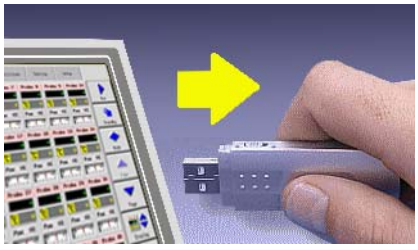
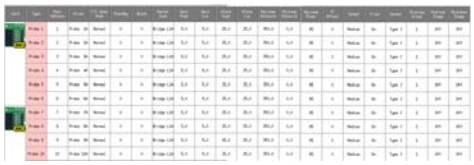
Servicing and Repairing your controller

Print Out Facility (to Printer)

Touch [**Print**] for a page record gives either:	
A Screen Picture if you print from DISPLAY page (including Zoom view) GRAPH page Or…	 
A Table Print-out if you print from SETUP page TOOLSTORE page TESTING page	

Print out to File

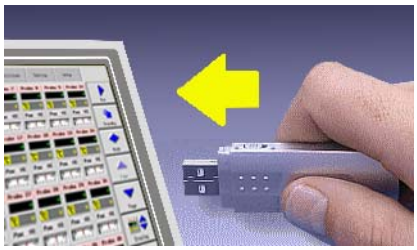
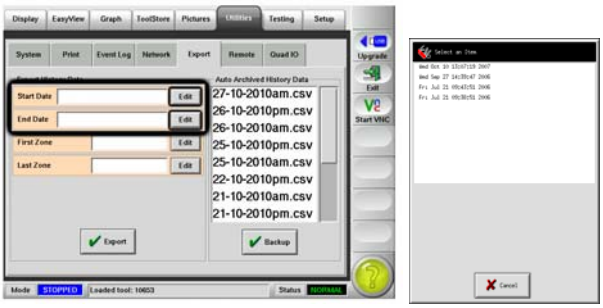
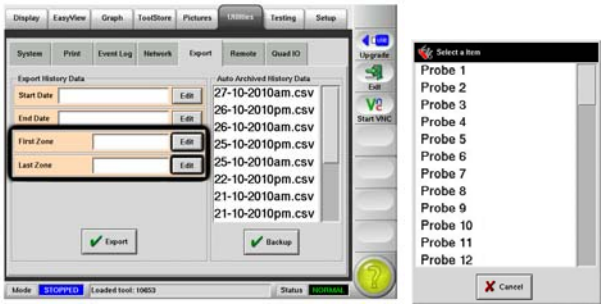
Rather than print to a printer, either local or network connected, you can print any of the normal print options to a USB Memory stick.

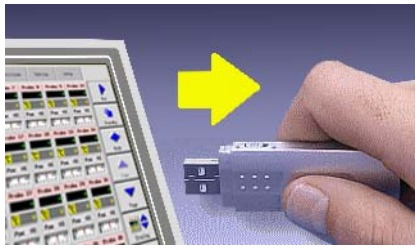
Insert storage media then wait about 10 seconds until the USB Memory is ready to use.	
Select Utilities and Print page. At the Connection option touch [**Edit**] and select [**Print to File**]	
On return to the main Print page you will see that the second Printer Setting has changed from “Model” to “File” and see that this option defaults to PDF. For different print options touch File [**Edit**] and select JPEG, PNG or PDF	
Return to any page (eg the Setup Page) and touch the [**Print**] button on that page.	
When done wait about 10 seconds then remove storage media and take it to a Personal Computer	
Plug the USB Memory stick into a PC to view the printed page.	

Export Facility

You can extract the last 24 hours of zone performance data as a zipped spreadsheet. This data is written in a CSV (comma separated value) form, and then compressed into a zip file before exporting.

To extract the data:

Insert storage media then wait about 10 seconds until the USB Memory is ready to use.	
Select Utilities and Export page.	
Select the period by touching [**Edit**] in the Start and End boxes	
Select the zones by touching [**Edit**] in the First and Last boxes,	
Touch [**Export**]	

When done wait about 10 seconds then remove storage media and take it to a Personal Computer	
Decompress the exported data-file into a standard CSV (comma separated value) format.	
Import Data to a spreadsheet	

Self Diagnostic Tests

The Controller has a diagnostic testing tool, which has two main options within its test profile.

1. Power Test

Power Test is a facility that can only be used on Current Measuring cards (6MODC, 3MODC etc). It performs a quick check to see that just the heater zones are functioning correctly and that the feedback from current sense coils are consistent with tools history file. It does not check for zone wiring errors or similar and it is designed as a maintenance aid only.

2. Full System Test

The Diagnostic test allows you to check that every zone is functioning correctly. It is the correct routine that you should use:

- as an acceptance check
- to see that a new tool is wired up correctly
- as a maintenance aid, to check that a working tool is functioning correctly.

The following describes the test sequence to show how it works.

1. It cools the whole tool	…during which time, all zones are checked to see that none experience a significant temperature rise.
2. It heats the first zone and checks to see that	**a)** the first zone rises sufficiently to qualify as a “Good Rise” – if not it increases the applied power and looks for the “Good Rise”. It continues to raise the power and look for a Good Rise until the configured “Heat Time” expires. If it does not see a good rise within that time then the zone has failed. **b)** the temperature of the zone under test does not reduce further – which would indicate a reversed thermocouple on that zone. **c)** no other zone raises enough to become a “Bad Rise” which would indicate excessive thermal conduction between adjacent zones. **d)** no other zone rises by as much as the “Good Rise” which would indicate cross-wiring between the zone under test and another thermocouple.
3. After completing the test on the first zone, the routine then moves on to subsequent zones until all have been tested.	

Why you may need to change your test parameters

Normally there is no reason to alter the test parameters in your self-diagnostic routine. Therefore, if you have any doubts or queries please contact your supplier for advice before you change any test parameters.

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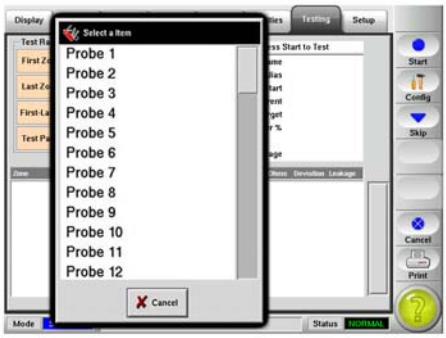
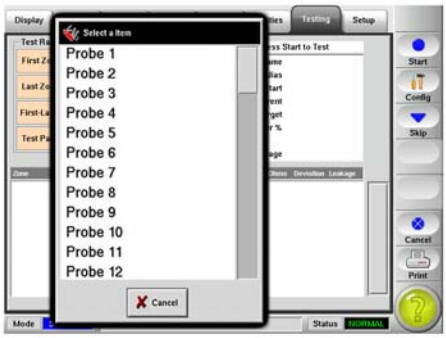
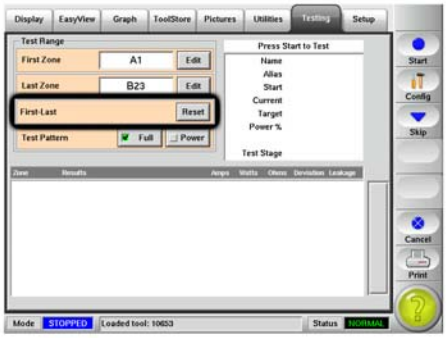
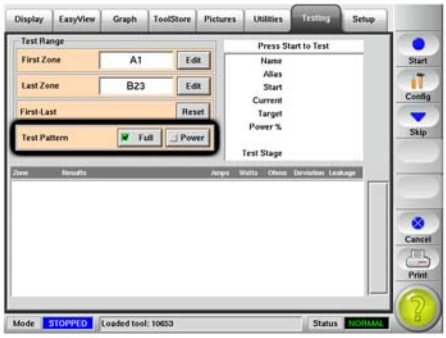
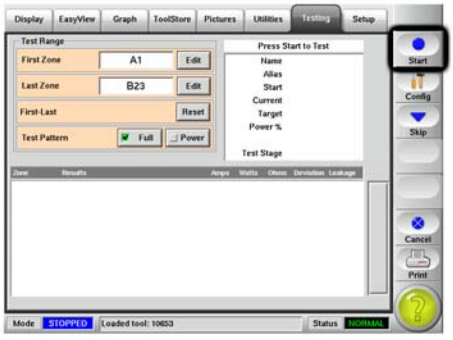
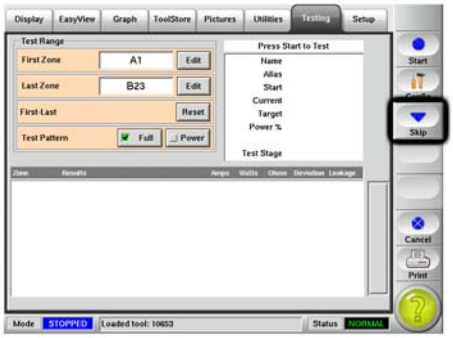
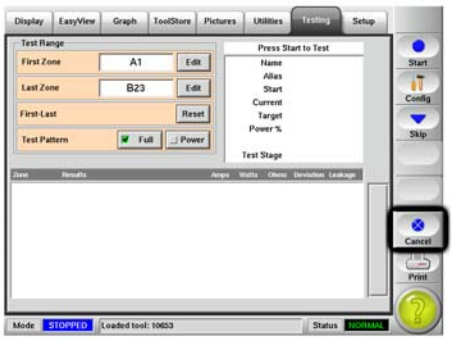
Running a Self Diagnosis test

The diagnostic routine may be performed at any time that the controller is connected to the tool, provided that it is not in use for production.

The other panels on the page give feedback about how the test is progressing.

To select some zones for testing	
Touch [**Edit**] in the First Zone box	
Select the first zone Repeat for the Last Zone	
To select every zone for testing	
Touch the First-Last [**reset**]	
For a full Self-diagnosis – Check that the Test Pattern is set to [**Full**] For the reduced Power Test select [**Power**]	

Touch [**Start**] Test progress for any one zone is shown in the upper right panel. Test history fall all zones is shown in the lower panel.	
To pass by or skip any zones touch the [**Skip**]	
To stop the test and omit remaining zones, touch [**Cancel**].	

System diagnosis results

The Test page retains information about any test that is run. You can scroll the screen to view all the results or touch [**Print**] for a hard copy. You may also [**Save**] the test results as a reference set. Future tests will then show any difference between the current test and the saved reference.

Interpreting the test results

A result is given for each zone tested as a table form which shows five columns that are

1) Zone tested - shows which zone number for which the results are applicable.
2) Test results –"Zone Test OK" tells you there were no problems detected. Alternatively, it displays one of the messages listed below to explain why the zone test was not good
3) Measured Amps – shows how much current was measured as a result of applying a set voltage.
4) Measured Watts and Ohms are derived from measured current and the given system voltage.
5) Deviation – shows the difference between the current readings and those that have been saved.
6) Leakage – shows if any earth leakage current was measured.

Unsatisfactory Test

Below is a complete list of the various messages along with further detail and possible causes.

User skipped Test - You skipped the test for this zone by pressing [**Skip**] while it was being tested.

User Aborted Test - You aborted out of the test by pressing [**Cancel**].

Open Circuit T/C - Thermocouple detected as being open circuit. Check thermocouple wiring for displayed zone.

Blown Fuse - Check card fuse. This message is also displayed if the zone was set to use an off board triac that was not installed. N.B. Off board triacs have their own fuse.

No Mains Sync. Pulse - This is probably due to an error in the supply wiring.

No Card Present - No card was detected in the rack at the slot identified with the displayed zone.

Cooling Test Failed - All zone temperatures had to be stable or falling before the heating test begins. If any zones continued to rise with power set to zero within the cooling period, this error is raised.

Heating Test Failed - Temperature did not rise by the set number of degrees within the heating period. This may be caused by an open circuit heater, a pinched, shorted or dislodged thermocouple, or the zone was set to on board triac when the cabinet was wired for off board triacs.

Check for Reversed T/C - Temperature appeared to be decreasing when power was applied.

Below 0 or Reversed T/C - May be caused by a reversed thermocouple. Also, in the unlikely event that the test was carried out at an ambient temperature below 0°C, the controller would not work with the resulting negative temperature readings.

Failed to React Correctly - Unexpected results. This message is followed by further error messages.

T/C Interaction with zone NN? - A different zone(s) to the one being tested had an unacceptable rise in temperature (greater than Bad Rise set in Test Values). Indicates faulty T/C positioning or close zone proximity.

Heater/TC Common with zone NN? - Cross-wiring fault between displayed zones. Could be either Heater or thermocouple wiring at fault.

Message Overflow - There is a limited amount of memory available to store test results. If this message is seen, too many errors have occurred to store them all.

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Servicing and repairing your controller

Always isolate your controller at source before you open the unit to inspect it or replace fuses.

Only use Ceramic Body Fuses on Control Cards, NEVER use glass bodied fuses.

Replacement parts

We do not expect that you will need to repair any controller parts at board level other than fuses. In the unlikely event of any board failure then we provide an excellent repair and exchange facility for all our customers.

Cleaning and Inspection

Inspect the fan filters at regular intervals. Both the upper and lower filters covers can be removed by the inserting a wide-flat screwdriver blade and carefully twisting them off. The filters are removable and a light tapping action removes loose dirt and dust. Failure to do this reduces the flow of cooling air and may cause overheating. If filters do become clogged, they need to be replaced and these can be obtained from your supplier, quoting the serial number of the cabinet.

Any excess dust that has entered into the cabinet may be removed with a light brush and vacuum cleaner.

Any internal cable forms, that flex to accommodate opening doors, should be checked to see that there is no fraying, or damage, to cable insulation.

If the equipment is subject to vibration then we recommend that you use an insulated screwdriver to check that no terminals have become loose.

External cable-looms should be checked to see that there has been no damage to the flexible conduit, plugs or sockets. If the flex has been squashed, if there is visible damage, or if there are any exposed conductors, then, for your own safety, it must be replaced.

Picture shows where filter cover may be taken off in order to remove filter and clean or replace it.

Upgrading

In order to maintain our high quality, our development engineers are making continual improvements to our control system.

It may be possible to apply system upgrades to your own controller; however, this would depend on the type and age of your equipment. Contact your supplier with the serial number of your console and he can tell you about whether your console will accommodate and upgrade and what may be available.

There is usually no need to return your control system to your supplier for any upgrades. They may be downloaded via the internet.

These following instructions will guide you through the upgrade procedure.

Preparation

1. Download the upgrade from the internet onto your PC.
2. Copy the upgrade program/data onto suitable storage media (USB Flash)
3. Before you start any upgrade, shutdown your machine to leave your console free

Procedure

1. Select the Utilities page.
2. Insert the USB Flash Memory
3. Touch the [**Upgrade**] button
4. When the upgrade is complete remove the USB stick and restore the console.

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Troubleshooting

The control system has several features, which provide an early diagnosis of faults in the control system, the tool heaters and thermocouple sensors.

If the system detects any malfunctions, in one or more of the control zones, then it displays an error message on the Main Display page in place of a temperature value.

If the system detects any abnormal condition it displays a warning message in the Main menu

Fault and warning messages

Any of the following messages may be displayed on the Fault Indication line:

Error Message	Cause	Action
AMPS	The controller is unable to supply the current requested. (Note: This error message is most likely to be seen if the particular zone is set as a Spear type)	Isolate system supply, check loom and heater wiring continuity. Also, check the heater resistance against other known good zones to see that it is not noticeably higher than average.
ERR!	Little or no temperature rise has been detected in that zone. When the console starts to apply power it expects to see an equivalent heat rise at the thermocouple. If the Thermocouple has been trapped and pinched elsewhere in the tool or cable then it cannot see the full heat rise that occurs at the tip. If left uncorrected then there is a danger that the zone could overheat and damage the tip. Instead the circuit maintains the output at whatever level it reached when the monitor circuit detected the fault and the error message was displayed.	Check thermocouple wiring, it may be reversed. Heater wiring may be faulty or element may be open circuit.
FUSE	The fuse for that zone has failed. Please Note: A fuse can only fail due to a fault external to the controller. Identify and rectify the fault before replacing the fuse. Note: The fuse detection circuit requires a continuous low level current through a high impedance bleed resistor to maintain the alarm condition. As a result the load circuit is still connected to the mains voltage supply and it is not safe to attempt to repair or replace the fuse without first isolating the circuit. If the fuse in question is mounted on a control card then it is safe to unplug the board in order to isolate the circuit and replace the fuse on the card.	Replace the fuse with one of the same rating and type, i.e. High Rupture Current load fuse. The blown fuse is located either on the control card or on the off-board triac module (If fitted).
GND	The system has detected an earth fault. (Note: this can only be detected by controllers fitted with EM Cards or MD240 diagnostics)	Check your heater wiring for a low impedance path to earth.

Error Message	Cause	Action
HELP	There is a system failure and the console does not know how to respond. (This alarm may occur if an older model console is connected to a later version cabinet. If the early version console does not recognise an alarm that has been generated by a later generation control card then it cannot display an appropriate alarm message. The console software has a routine to check incoming messages and it flags up a HELP message if such a condition arises.	Please make a note of the serial numbers for both the controller and console. Also note the console software date on the Utilities page. Contact your supplier with this information to hand.
HIGH	The water-flow sensor has detected a high flow rate.	These are only monitored conditions, and neither will cause any shutdown, or pause, action. However, you should check that the coolant water system is not blocked, or leaking, to ensure that no overheating occurs.
LOW	The water-flow sensor has detected a low flow rate.	
LINE	No mains supply synchronisation pulses being received. The three-phase supply is used in a cross-over detection circuit to generate timing pulses for accurate phase control and firing the triac. If the phase detection fails on one or two phases then there is no pulse to use to measure phase angle and the LINE error message is generated. Meanwhile, all circuits on the healthy phases will continue to work normally.	There is a phase detection circuit on each M2-series card and a common phase detection circuit on all other controller types. Although a fault in such circuits may cause the LINE error message, such fault is very rarely seen. The most common error is either the absence of one phase or, if a plug has been re-wired incorrectly, a swapped phase and neutral. If a LINE error message occurs then switch off and isolate the controller then check supply wiring for presence of all three phases.
LINK	This will occur if the console is switched to a remote controller with a network link but it cannot establish any communication with the remote unit. The console can display the appropriate zones for the particular tool but it cannot relay any temperature information. It shows a LINK fatal error in place of the actual temperature.	Check that the network link is good and/or the remote controller is still switched on and available.
LOAD	No load on that zone. Only occurs when in manual closed loop mode where the current is pre-set. The current sensing circuit has not detected a current flow; therefore, the zone is flagged as not having a load.	Isolate the system supply and check the connections between the controller and the tool heaters. Also, check the heater for continuity
OVER	The RTD zone has detected a temperature in excess of 99°C. This is an abnormal alarm because RTD circuits can only read from 0-99 deg so a fault must be suspected and investigated. Meanwhile, no control zones are affected.	Check that a different RTD has not been fitted.
N/Z	All the control cards are interrogated in sequence, on a working controller you can see the SCAN LEDs flashing in a sequence as each card is briefly checked for satisfactory communication. If any card fails to respond to the console then an N/Z error message is displayed for the offending zone. Unlike other alarms in this list, N/Z does not normally initiate a System alarm. However, there is an option within the setup Configuration which gives the option of making N/Z a system alarm if so desired. (See page 37)	If every zone shows N/Z and no cards show or flash their SCAN LEDs then check the communication lead between the console and the controller cabinet. If only one or two zones are displaying N/Z then check the card for faults. If you have recently changed any cards and put any older discrete-component cards into a new controller that has surface-mount cards then it is possible that the console's modern scan speed is too fast for the older control cards. In such a condition, check the console baud rate and try setting it to Low. If this cures the problem and you later replace the older card for a newer surface mount version then remember to reset the Baud rate back to high for optimum working.
NONE	The console has detected a control card that has no settings.	This Error message may be seen fleetingly during switch on, it should disappear after the initial card scan. If the message persists then you may need to re-apply the correct card settings on the Setup page.
REV	The card has detected an abnormal input at the T/C termination that indicates a shorted or Reversed thermocouple.	If the REV alarm persists then you should switch off the controller and investigate the offending zone. Alternatively you could slave the offending zone to a good zone until you have time to clear the fault.

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Error Message	Cause	Action
RTD	The RTD monitor cannot see an input (RTD is open circuit)	Check the RTD and its wiring for a broken connection.
T/C	An open circuit thermocouple has been detected and no auto-response has been selected in the T/C Open Error column of the Setup page.	For immediate recovery you can either slave that control zone to an adjacent zone or change to open loop control. Make a note of the above action so that when the controller is free you can check to see whether the input fuse on the control card has ruptured. If the fuse is good then you may need to check the wiring for faults or even replace the thermocouple.
TRC	If a triac fails it goes short circuit and passes full load current. In such a condition you have lost control of the load and cannot switch it off from the console. The TRC alarm flags up the fault state which relies on operator intervention to manually shut the system down. Note: the triac monitor does not function in auto mode. If the triac were to fail while the zone is run in auto then the only indication will be an abnormally high zone temperature because the triac is passing high, uncontrolled current. The TRC alarm is only seen if a triac fails on a zone that is running in closed-loop manual condition.	If the triac has failed, return to your supplier for repair.

Warning Message	Abnormal Condition
MAN	The control zone is in manual mode.
S #	The zone is slaved to another control zone, where # represents the number of that zone, i.e. S 2 means the zone is slaved to Zone 2. The same power is being sent to both zones. In the Display page, the set point displayed on the selected zone is the same as that on the slave zone.
TEST	Displayed when the zone is in diagnostic test mode.
WARN	If during the test procedure a temperature interaction is found between zones, this message is displayed.
FAIL	The zone under test has failed.

Individual Controller Card Diagnostics

If a fault on a control card is suspected, check the LED card status lamps.

From top to bottom they are: -

SCAN – this LED flashes briefly as the controller interrogates each card in sequence.

FUSE – Should normally be extinguished. It lights to show that an output fuse has failed.

TC – Should be normally extinguished. It lights to show that the card has detected an open-circuit fault on the thermocouple circuit.

GF – Should be normally extinguished. It lights to show that the card has detected a ground fault on one of the zones controlled by this card.

LOAD (L1 to L2/L6) - The Load LED(s) should also be normally lit, and a pulsing appearance shows that there is a regulated supply being delivered to the load.

To remove a card from its slot, pull the red handles forwards and gently pull the card out. There is no need to switch off the main supply

NOTE: The shrouded terminals on the Euro back board are live, unless the power supply is switched to OFF.

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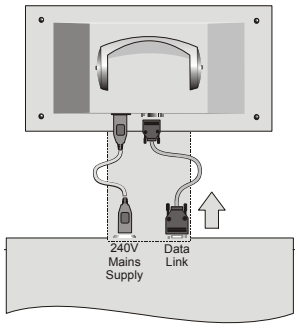
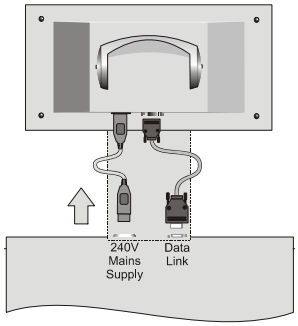
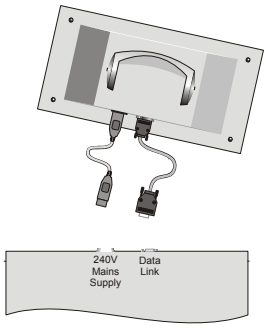
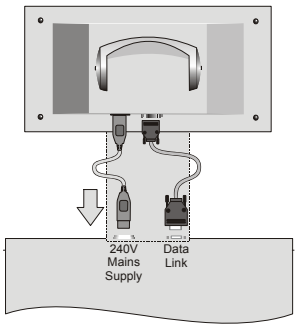
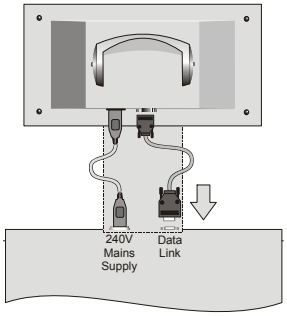
TouchScreen - removal and reconnection

Provided you are not using cycle-synchronised probes, the display console can be unplugged while the system is running without causing immediate problems. However, we recommend that you only do this to recover from an emergency situation and that you run the system without a console for as short a period as possible.
The task is easier if it can be done after shutting down the whole system.

Removing a console

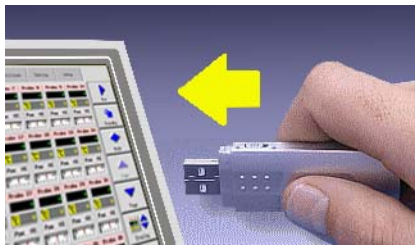
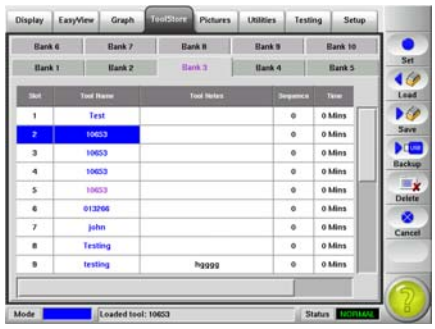
Unplug the data lead	
Stop the console by touching [**Exit**]	
Unplug the power lead.	
Remove the console	

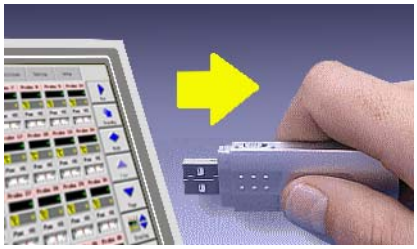
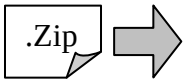
Reconnecting a console

Connect the power cable first	
Check that the correct tool is selected	
Touch [**Run**]	
Reconnect the data cable	

Other problems with the Tool

If you find that the Controller is not running correctly and cannot resolve the problem with either the manual or on-line help then it may help if we can see exactly how your system is configured.

Insert Media then wait about 10 seconds until the USB Memory is ready to use.	
Open the ToolStore page	
Select the tool	
Touch [**Backup**]	
Select Export on the Utilities page	

Set the Start and Finish time to cover the problem period.	
Set the First and Last of the zones that you wish to examine.	
Touch [**Export**]	
Wait about 10 seconds then remove storage media	
Download both files to PC	
Email files	 "help@moldmasters.co.uk"

On receipt of your mail and attachment files, we can load your files into one of our own controllers and will try to analyse the problem.

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M2-Series Fuses

There is an Miniature Circuit Breaker that offers general over-current protection for the complete unit.

Supplementary Fuses

All the supplementary circuits (Console supply, Power Supply, fans) are protected a pair of fuses which are fed from the upper and lower supply busbars.

These are Din-rail mounted and can be found inside the front door at the top of the cabinet.

Class	20mm Glass Fuse Antisurge
Rating	10 A

Controller Cards

The current controller card has protection fuses for both the T/C input and for the heating load output.

If the Fuse LED indicator shows that the output fuse has ruptured then the card may be easily removed and the fuse changed. Only use Ceramic Body Fuses on Control Cards, NEVER use glass bodied fuses.

If the T/C LED indicator shows an open circuit T/C circuit then this may indicate that the input fuse has ruptured.

Output Fuse Type: HRC High Speed

Card type	Z6	Z4	Z2
Fuse Rating	5A	15A	20A

Input Fuse Type: Surface-mount quick-blow

Part Code	62MAQBSM
Fuse Rating	62mA

Appendix A – HRC Wiring Details

1.1 Three phase Designation

Please take extreme care when connecting the controller to the three-phase supply. Incorrect connection may result in damage to the controller.
The controller is normally supplied according to your requirements in either a star or delta supply. However, some models may have a dual supply option which accepts either Star or Delta 3-phase supply.

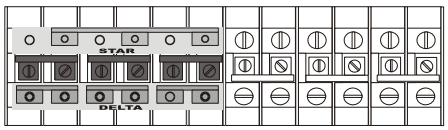
Cable Marking	Supply Description
L1	Phase 1
L2	Phase 2
L3	Phase 3
N	Neutral*
Earth Symbol	Earth

*N.B. The delta supply cable does not have a neutral wire.
Cable colours may vary therefore wire up according to the Cable Markings.

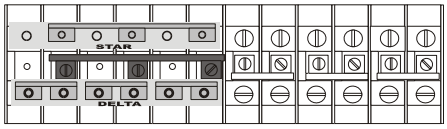
1.1a Star /Delta option

Where a cabinet is fitted with a dual supply option then there are two places within the rear of the cabinet that you must alter to change between Star and Delta supply.

Do not change the supply wiring until the controller has been disconnected from all electrical supplies.
At the upper connection blocks, change the Star/Delta cross-links using a single 3-way link for Star supplies or three 2-way links for Delta supplies. The connector strip shows the appropriate cross-links to use and looks similar to this diagram.

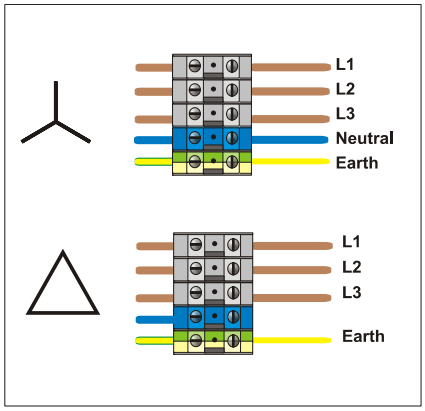


Three 2-way links for Delta Supply



One 3-way link for Star Supply

At the base of the cabinet is the mains connector strip that will accept a Star or Delta supply cable.
Use only 4-core supply cable for Delta connection and 5-core supply cable for Star connection. Wire this cable into the lower terminal blocks to match the particular supply; as shown in the adjacent diagram.



1.1b Current limiting fuse option

Where the 3-phase supply may have a high prospective sort circuit current then Current Limiting Fuses may be required. These will be located in the base of the cabinet. You may find inline fuse holders in place of the bottom connectors where the incoming flex-cable is normally terminated

1.2 Loom Thermocouple cables

Where a thermocouple cable uses conduit with individual conductors, rather than multi-core cable, then the colour of the thermocouple conductors are as shown below.
RTD thermocouple cable colours and number may vary. Refer to controller documentation for details.

Type	Positive	Negative
J	Black	White
K	Green	White

1.3 Loom Power cables

Where a power cable uses conduit with individual conductors, rather than multi-core cable, then the colour of the power cable conductors are as shown below.

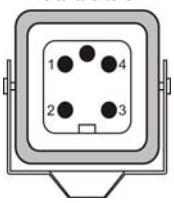
3-phase type	Supply	Return
Star or Delta	Brown	Yellow

1.4 Alarm Output / Auxiliary Input

An option cabinet connector provides an alarm output from an internal set of relay contacts. Using an external power source the cabinet can initiate a number of warning devices whenever any zone goes into an alarm state. This is commonly used for beacons, audible alarms or informing the moulding machine. In order to capture fleeting alarm conditions, the relay is held on for about 15 seconds after the alarm condition is cleared. The contacts are rated for 5A at 240V.

Pin	Connection	Input / output
1	Auxiliary Input signal	*Dependent on Spec
2	Auxiliary Input Ground	
3	Alarm 240v contact 1	Normally Open Contacts
4	Alarm 240v contact 2	

HAN4A



An optional input can be accepted through the same connector. It may be used for Cycle Synch spear tips, Inhibit Mode, remote Boost or Standby or any other user-definable function. For exact details, consult the specification for the particular model.

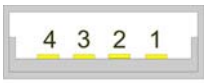
1.5 Serial Port

A male 9 way D panel connector can be provided for an RS-232 serial port, which is used to communicate with a remote computer for data collection. The pin outs are as follows.

Pin	Connection
1	-
2	Transmit
3	Receive
4	-
5	Ground
6	-
7	Handshake
8	-
9	-

1.6 USB Port

A USB port is standard on all Touch Screen Consoles for connection to a printer or plugging in Memory Sticks for other functions such as backup and restore.



USB Type A

Pin	Name	Description
1	VCC	+5v DC
2	D-	Data -
3	D+	Data +
4	Gnd	Ground/Earth

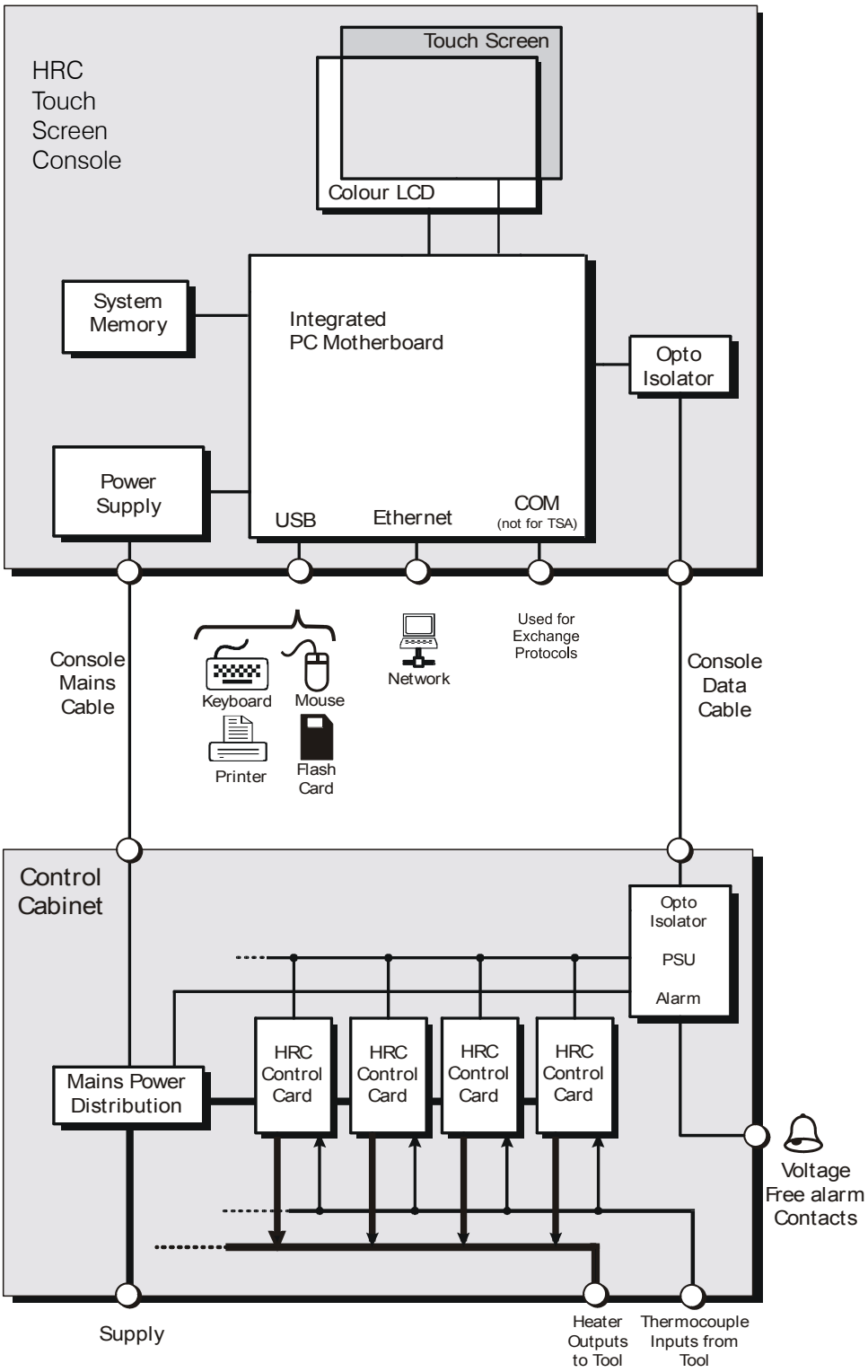
1.7 Remote Tool Load Connector

The IO5 offers extra input/output functions that enable remote tool loading. This connects to your remote machine via an AMP 183040 circular connector in which the pins are configured according to the table.

AMP 183040-1 Connector

Pin	Function	
1	"tool load" signal from molding machine to ask console to load tool	
2	address 1	
3	address 2	
4	address 4	
5	address 8	
6	address 16	
7	address 32	
8	address 64	
9	address 128	
10	spare	
11	"Tool loaded signal" from console to molding machine	Normally-Open
12		Common
13		Normally-Closed
14	GND	

1.8 Touch Screen Schematic



Appendix B – Networking Information

How the Console and Controller work together

Because each individual controller card has its own central processor then, once it has received a signal to start and knows its set temperature, it can function independently and hold the zone temperature until it is switched off. This means that once you have switched the system on, and it has reached a steady state, the console could be removed without affecting the cabinet. However, without the console, you have no means of monitoring the system, changing any set temperatures or shutting down in a controlled fashion.

This generally means that if an accident, or major fault, causes the console to fail, the controllers in the cabinet can, if necessary, maintain production until another console could be provided.

There is, however, one configuration that cannot lose the console and still maintain normal running. Thermal gate control probes use cycle synchronisation for their operation and they depend on the console for their gate timing. If your tool uses these particular probes then a console failure or disconnection does stop normal production.

If you should need to remove and/or reconnect your console during production then refer to “Removing a Console (on page 111) for advice.

Console and Controller variations (TS and KTS only)

There are more variations from the normal one-to-one situation described on the previous page.

One Console to many Controllers

If HRC-NET cards are installed in two or more controller cabinets, it allows a networked console to switch its focus between the controllers.

Once you have started a controller cabinet and set the operating temperature, each control card can function autonomously using its own microprocessor. This allows you to switch the console’s communication away from one cabinet to startup, or monitor, other remote controller cabinets. While the console is focused on any one controller cabinet then it is not monitoring the others in its group. However, the alarm/beacon on a remote cabinet shows if any remote cabinet needs particular attention.

To switch between different controller cabinets use the ToolStore page - this switching process is detailed in the “Connection” paragraph on page 74.

Linked Controllers

Multiple controller cabinets can be linked in such a way that they behave like a single controller. A data link is used between the controller cabinets and the DIL-switch on the back-plane board is configured sequentially through the multiple controller cabinets. For instance, where a 60-zone cabinet and 30-zone cabinet work together, they could be configured together to appear as one 90-zone controller. A single console could be connected to either controller and it would display all 90 zones as a single controller.

Also, if each of the cabinets had a console, then the two consoles would work in parallel, as a “many-to-one” configuration and this is described below.

Many Consoles to one Controller

If, in the above example, two linked controllers each had consoles fitted then they would act as “Many-consoles-to-one-controller”. The first would be directly connected to the cabinet via its data link and be the Master console. The second console connects to the first, via an Ethernet link, to the first and nominates the first console as Master by using the “Master IP Address” setting on the Utilities-Remote page.

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When you have two or more console commanding a single controller then one only is connected to a Controller cabinet via its own Data Link. This is the Master Console and you should note its IP Address (which is printed on the console case). Sub consoles must be connected to the Master over a network. On those consoles, you must open the Remote tab on the Utilities page and enter the first IP Address into the Master IP Address box on that page. Once this has been accepted and communication established then you are able to control the one Controller cabinet from any of the linked consoles. Any changes made on one console are shown on all the others.

Configuring a Networking connection

Touch Screen consoles can communicate over an Ethernet network in order to pass information both to and from the console. You can set up your network connection within the Utilities page by touching the [**Network**] tab to see this screen.

What facilities Networking offers

Provided your remote terminal has an X-Win server, or similar application, you can easily communicate with the console to return an emulation of the working program. This means that you can monitor the Touch Screen Console and you also have the facility for remote control. If you have network connections to multiple consoles then you can transfer files such as tool settings between the different machines.

How to make the connection

In order to use this facility, connect your console to an active network using a T-base lead to the socket on the Touch Screen computer.

The next step is to allocate a unique name to the machine within your factory environment and set the domain name for your own system.

Obtaining an IP address depends on the size of your internal network. For connection to a large network it may be sufficient to enable the Automatic IP facility. On a smaller network you may need to disable the automatic facility and use the [**Edit**] buttons to enter your preferred IP address and Sub-net mask details.

Networking configuration depends a lot on your system and should only be carried out by competent IT staff. Should you need further information please contact your supplier.

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Configuring a Remote Connection

The Remote tab on the Utilities page allows you to configure two different functions.

Remote Applications

A VNC application is available to connect to, monitor and control an external application that is hosted on a remote networked computer. You can use either the whole screen, or just part of it, to view the remote application.

To start the remote application

1. Open the Utilities page.
2. Touch the [**Remote**] tab.
3. Enter the IP Address of the remote networked computer
4. If the remote application is Password protected you need to enter it into the VNC password box, or, if it is not, then the Password box may be left blank.
5. Select whether you wish to run the remote application within the existing [**Window**] or at [**Full Screen**] size.
6. Touch [**Start VNC**] to initiate the remote application.

To Close the remote application

From the Utilities page…

1. If the remote application is running within the remote window, then touch [**Stop VNC**] on the side bar.
2. If the Remote application is running at full screen size then there is no immediate control available to Stop VNC. Instead, a timer offers a [**Stop VNC**] option 10 seconds your last button push on the remote application. You can accept the [**Stop VNC**] option to return to the Utilities page or [**Cancel**] it to remain with the remote application for a while longer.

Multiple Consoles using Master IP Address

This is used to connect one TS Console to another such that two or more consoles may work together to control one single device provided they are all interconnected via a Local Area Network.

To start, enter the IP Address of a remote Master Console which is already linked to a controller cabinet. The local console will search the LAN for that console and establish a connection. Once this has been done then both consoles command and monitor a single controller cabinet.

Any commands, such as Start of Stop, may be entered on either console, that command will be carried out and both consoles will see the appropriate changes. The two consoles are then in effect, working in parallel.

Appendix C – Extra Cards

Extra facilities that can be fitted to the M2-series Controller,

B1. 16DLI - 16-channel DL Input Card:

The Digital Logic Input card can be supplied wherever there is need to accept a digital input. The input logic values are determined by software programming and are not a user available function.

B2. 12 channel RTD Input Card:

This card is used for cooling water measurement and display. The 12RTD is set-up as a Special in the Set-up page, and the measured temperature is displayed on the Display page with a range of 0 to 99°C and resolution of 0.1°C.
The RTD card may have Alarm levels set and any deviation outside these limits may just trigger a Warning Beacon or shut down the mould according to your needs – this response option can be set in the “Configure Alarms” choice on the Setup Page.

B3. WT4 12-Channel T/C Card

This card can accept up to 12 zones for either J or K-Type thermocouples. It provides channel monitoring with 1st and 2nd stage alarms. Monitored zones display as a normal cavity zone with actual temperature constantly displayed while the “Set” temperature in the second box refers to the nominal expected temperature, either side of which the lower and upper alarm levels are set.

B4. AI8 - Analogue Input Cards

The analogue input card has eight inputs that are used to read analogue output devices with an output range of 4 – 20mA. These are usually associated with coolant flow detector devices that are calibrated for particular flow rates.
When the auto-detect procedure sees one or more of these cards within the controller cabinet then the Setup page displays an Analogue Input column. After selecting the flow zones and the Analogue Input column, touching [**Set**] displays a range of devices that are known to match the Analogue Input.

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Appendix D – Water Manifolds

Installing and configuring a Water Manifold

The M2-series controller provides a compact system for monitoring the coolant system within a mould. Each controller may vary slightly in its make-up but, generally, it comprises:

- a Controller Cabinet with
    1. analogue input cards
    2. other control cards as required
- one or more water manifolds with flow sensors and /or pressure sensors
- Sufficient data-cable to link the manifolds to the cabinet.

Installation

The water manifolds should be firmly mounted in a position that will not be subjected to excess heat, vibration or other undue stress.

The coolant system should be plumbed in by a qualified fitter ensuring that the flexible coolant pipes are not trapped by moving parts or kinked by being stretched around corners or similar obstructions. There should be a main flow and return shut-off valve provided so that the water manifolds may be easily isolated for repair or maintenance. You should not use any liquid sealant that may contaminate the coolant circuits.

The cables that connect the water manifold to the controller are marked for identification and should be connected to the appropriately marked sockets on the sensors and the controller. The cables should be adequately supported using suitable cable tray or individual cable cleats in accordance with the current IEEE Regulations for Electrical Installations.

Coolant Monitoring

It is possible to monitor up to three different coolant properties using the following apparatus

Temperature – there is a choice of two main cards to monitor water temperature

the WT4 card has 12 T/C Inputs

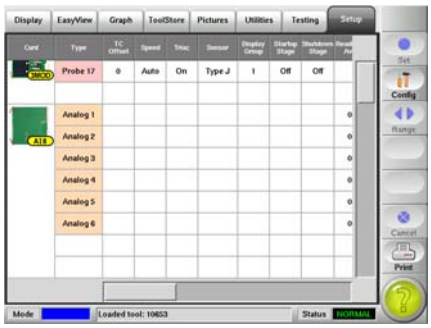
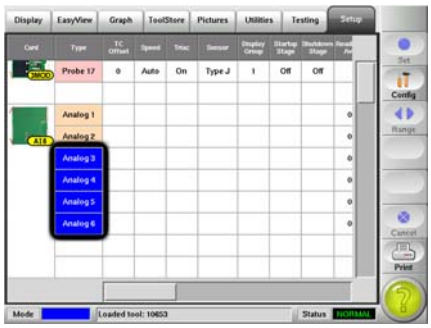
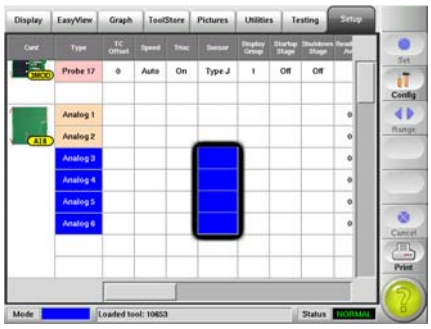
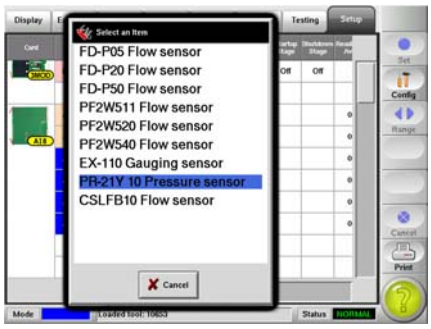
the 12RTD has 12 Resistive Temperature Device inputs and is often the preferred device for this application

Flow – there are many analogue devices which give a standard 0-20ma output that is proportional to the measured water flow – any one of these devices may be connected to one or more of the eight channels available on the AI8 Analogue card.

Pressure – like coolant flow above there are a choice of sensors that give a 0–20 ma output. These can also be connected independently to an AI8 card.

Basic Detection and Configuring

Once the manifold has been installed, the controller may be switched on and setup. The individual stages of setting up water flow and pressure have been brought together in the following steps.

Switch on the controller.	
Check the Display page to see whether the unit has already been configured with the correct number of Flow and Sensor channels and other control zones as required. If the Analogue Input zones are already configured then you may move on to step 8 and start by setting the alarm limits. If the Analog Input cards are new, and not displayed, then continue from step 3 below	
Open the ToolStore page and select a blank tool store location	
Select [**Detect**] and touch [**Yes**] – this should detect the Analogue Input cards and present them as a number of flow or pressure sense channels. It may also reveal other cards detected at the same time. Probe and Manifold heater zones need to be set up as shown in the manual on page 24 before returning here to set coolant monitoring.	
To set the Analogue-Input Function first touch the particular sensor channels which are connected to one type of sensor (flow, pressure, temperature etc)	
Then touch anywhere in the[**Sensor**] column	
Touch [**Set**] to open a Sensor pick-list and choose the appropriate sensors.	
To Set the Analogue channels monitoring limits… stay on the SetUp page, touch the analogue flow-zones and then touch any of the Alarms and Warning columns and then [**Set**] to setup 1st and 2nd stage alarms. Repeat for all High and	

Low levels.
To set the flows and pressure to normal expected values… open the [**Display Page**]. Select the flow-zones and then touch [**Set**] in order to type in a value (in litres/min) that meets the expected flow for those zones. Select the pressure-zones and then touch [**Set**] in order to type in a value (in Bar or PSI) that meets the expected level for those zones.
Set any other zones types that may be available according to the normal Setting Up procedure.

To Set "Reynolds Number" and "Difference monitoring" display

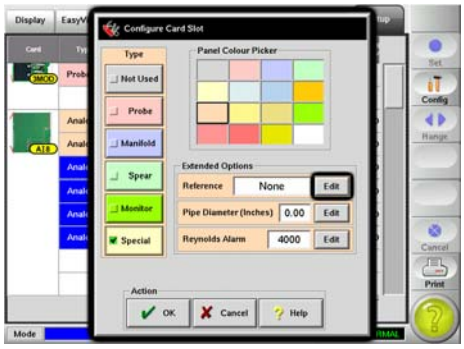
Setup Reynolds Number Display

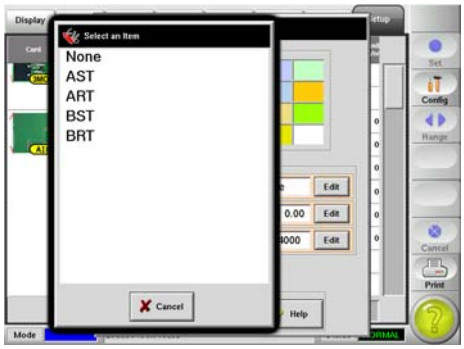
Reynolds Number – is calculated from a formula that needs three actual values for Flow-rate, water-temperature and Pipe-size.

On the Setup Page and select any one flow zone the touch [Set] to display the Configure Card panel.

This zone will provide the required flow-rate.

Within the "Extended Options" box you can provide the water-temperature by referencing an appropriate Temperature sensor. By "Reference" touch [**Edit**] and from the next option box select an appropriate Temperature sensor zone.
Finally, you can set the third parameter – "Pipe-Size"
(Note – The last setting within "Extended Option" allows you to set an alarm level for Reynolds number so that any value of Reynolds Number that deviates beyond an expected level will raise an alarm on the main Display Page.)





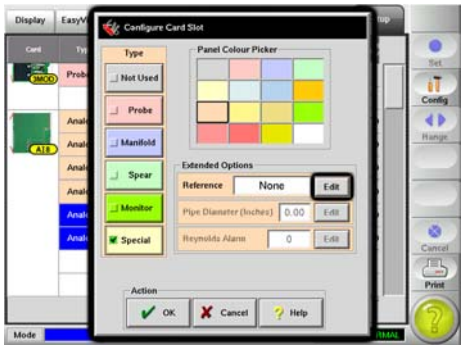
Setup Delta (difference) Display

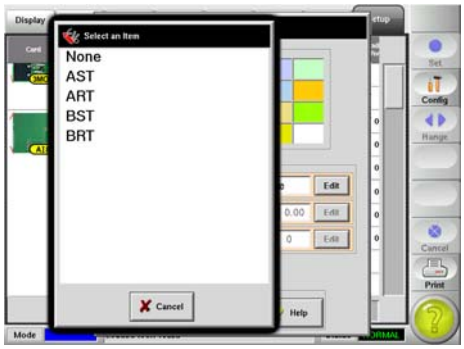
Delta (Difference) in pressure is simply calculated as the difference in pressure levels between two associated Pressure Sensors.

On the Setup Page and select any one pressure zone the touch [**Set**] to display the Configure Card panel. (note it is similar to a flow zone except that the Pie size and Reynolds alarm are greyed out)

Within the "Extended Option" you can select another Pressure zone to compare the difference between the two. By "Reference" touch [**Edit**] and from the next option box select an appropriate Pressure sensor zone.

(Note - when setting a differential comparison between zones "A" and "B", you must first go to Zone A and reference B – then you must go to Zone "B" and reference A. They must be mutually set as a complimentary pair.)



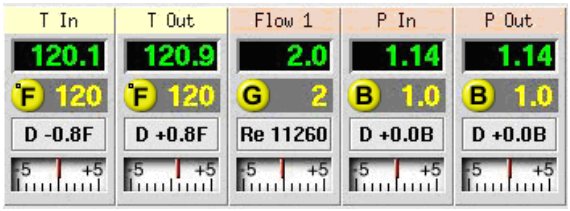


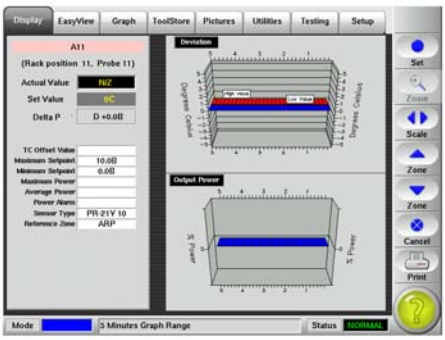
Display

This shows an example Display page which has cavity temperature, Flow temperature and Flow pressure zones. Most of the zones are cross referenced to show...

1) Delta T (temperature difference) in the cavity temperature zones
2) Delta P (pressure difference) in the coolant pressure zones
3) Reynolds Factor (flow analysis) in the coolant flow zones

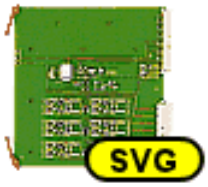
The zone page below shows the details for a typical coolant pressure monitoring zone.





Appendix E – Sequence Valve Gate

The SVG or Sequence Valve Gate card operates in a cyclic manner where it can open and close any of 12 remote gates up to four times during each cycle.



Each zone is individually configurable to open and close in response to:

- Time to the nearest 1/100th sec from receiving a cycle-start signal
- Position of the main barrel screw feed
- Pressure from a remote sensor located within the mould cavity
- A combination of the these three triggers

Each zone has one digital output to activate a valve gate and two digital inputs to accept feedback signals, one to confirm that the associated gate is closed and another to confirm it is open.

The card also has further inputs that affect the overall control. There are four digital inputs which comprise

- The “Cycle Start” input
- An “Enable” input which is closed while all systems are ready to continue moulding
- Two user definable inputs for other functions

There are three analogue inputs that are primarily used to receive a signal which is proportional to the physical position of up to two screw feeds.

There are three analogue inputs two of which are primarily used to receive a signal which is proportional to the physical position of two different screw feeds. The third is reserved for future development.

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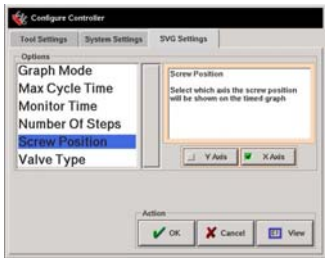
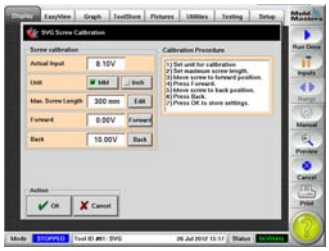
Setting Up

Part One – Inputs and Outputs

1) Check electrical interface connections with regards to the SVG Connections Diagram (will there be one provided anywhere?)
2) Where gating events are triggered by the screw position of the main barrel then it must first be correctly configured.
   Got to Display page and touch [**Inputs**]
3) Under “Analog Inputs” and “Sensor Setup” touch [**Setup**]
4) Follow the Calibration procedure …
   a) Edit the actual screw travel length
   b) Move screw to forward position and touch [**Forward**]
   c) move screen to rear position and touch [**Back**]
   d) Touch [**OK**] to save the settings and exit the screen
5) Activate the digital inputs for Gate Closed and Gate open as required



Part Two - General parameters



6) External connections – See Associated tool drawings Diagrams/tables are required
7) Go to Setup page to see the detected Sequence card(s) (NOTE: If no SVG card is seen then check to see you have the right tool selected. If the SVG card has recently been added then you may need to go to the ToolStore page to select a new blank tool slot and touch [**Detect**] so the console finds the new SVG card.)

   Touch [**Config**] and select [**SVG Settings**] tab (NOTE: this tab is only visible when an SVG card has been detected)
8) Set the parameters as follows

Graph Mode	Set the x-axis to be a function time or screw position
Max Cycle Time	Sets the period of time that is shown on the Display Period graph
Monitor Time	If you have active inputs to monitor that a gate is open and closed then the system will generate an alarm if it sends an open or close signal and the gate fails to operate. It does however take a finite time between sending the signal and seeing a response so this Monitor time allows you to set an acceptable time lag that must lapse before a failed event alarm is raised.
Number of Steps – (or events)	Select how many events for each gate you wish to provide for within one cycle,
Valve Disable	[**Enable**] this option if you want the pins to open only while in Run mode and when the zones are within temperature limits.
Valve Type	Allows you to select either Single or Dual Valve type

Part Three – Operating Parameters

9) Go to Display Page, touch any zone and touch [**Set**],

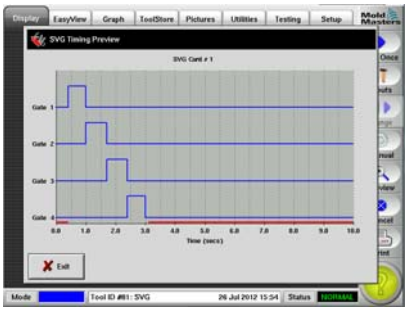
10) Set the running parameters for absolute time or actual screw position.

Touch all the gates and then anywhere in the first column (Step 1 Open Trigger).
Select Screw or Timer from the drop-down list according to your required operating parameter.

11) Set the opening and closing triggers for each gate. Touch the first gate then touch the [**Open value**] and use the keypad enter the value at which it opens. Repeat the same procedure to set close value.
(NOTE: The Screw position calibration is such that the screw position is at maximum when the barrel is at rear start of stroke and as it travels in then screw position falls to zero when at end of travel. So an open value might be 290mm while its close value may be at 270mm. The next gate open and close will be similarly lower
Inversely, Time counts up so starting a 0secs and increasing as the period counts up)

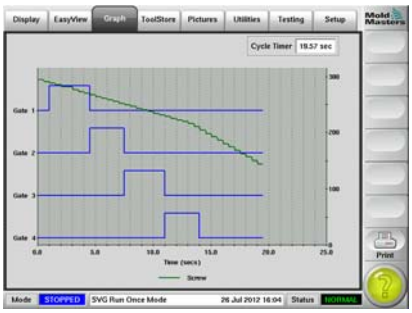
12) After you have set all the gate open and close values touch [Preview] to see a graphical representation of the gate operating sequence. Each gate is shown as a separate line on the graph. At the bottom a red line shows whenever there is no gate open. In most typical sequences you need to see at least one gate open at any time – the appearance of a red line along your sequent shows that you might have a gate setting incorrect. Inspect the settings more closely and adjust if necessary.

Touch [**Exit**] to leave the graph and return to the Display page.



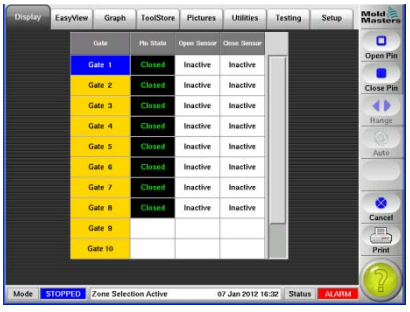
13) if you wish to test the run sequence then touch [**Run Once**].
Return to the main display page where you can select each zone and then go to the Graph page to get a real-time view of the gate operation.

The Sequencing should now be ready for live use.



14) If you manually turn on or open valve for testing purpose. You may select “Manual” button on the right.
Select valve gate and select “Open Pin” or “Close Pin” to manually open or close valve gate.

After manual operation is done, press “Auto” to return automatic sequencing mode. SVG card will immediately starts sequence after “Cycle Start” trigger comes in.



Setting up examples

Each valve gate can have up to 4 steps. The valve will act according to these step settings. A step consists of opening and closing the valve gate. The following are various scenarios for operating a valve during a sequence:

Opening and closing the gate on time values alone

Open the valve on an absolute time (relative to the start of the cycle) and close it on an absolute time value (relative to the start of the cycle)

Step 1 Open Trigger	Step 1 Open Value	Step 1 Close Trigger	Step 1 Close Value
Time (abs)	0.00 secs	Time (abs)	0.00 secs

Open the valve on an absolute time (relative to the start of cycle) and close it on at incremental time (relative to the when the valve was opened)

Step 1 Open Trigger	Step 1 Open Value	Step 1 Close Trigger	Step 1 Close Value
Time (abs)	0.00 secs	Time (inc)	1.25 secs

Opening and closing the gate on screw position alone

Open the valve on screw position and close it on the screw position.

Step 1 Open Trigger	Step 1 Open Value	Step 1 Close Trigger	Step 1 Close Value
Screw	0 mm	Screw	0 mm

Opening and closing the gate on a combination of both time and position

Open the valve on an absolute time (relative to the start of cycle) and close it on screw position.

Step 1 Open Trigger	Step 1 Open Value	Step 1 Close Trigger	Step 1 Close Value
Time (abs)	0.00 secs	Screw	0 mm

Open the valve on position of the screw and close it on an absolute time (relative to the start of cycle)

Step 1 Open Trigger	Step 1 Open Value	Step 1 Close Trigger	Step 1 Close Value
Screw	0 mm	Time (abs)	0.00 secs

Open the valve on screw position and close it on an incremental time (relative to the when the valve was opened)

Step 1 Open Trigger	Step 1 Open Value	Step 1 Close Trigger	Step 1 Close Value
Screw	0 mm	Time (inc)	0.00 secs

Note:
“time abs” = time absolute (Time is relative to the start of cycle start input))
“time inc” = time incremental (Time is relative to the when the valve was opened)

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